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PIT AND QUARRY

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OCTOBER, 1941

Palmetto Crushed-Stone Plant One of 1941's Finest . . . The Effect of Alkalies on Cement Producing Concrete for Saugatuck Dam . . . Blowing Mineral Wool at a Six-Cupola Plant

LUDLOW-SAYLOR

CONTROLLED-TEMPER SUPER-LOY WOVEN WIRE SCREENS

for super-severe service

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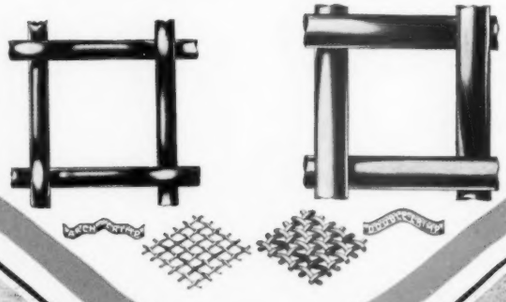
SUPER-HARD, SUPER-TOUGH, SUPER-STRONG

CONTROLLED-TEMPER SUPER-LOY WOVEN WIRE SCREENS

withstand abrasion longer—

endure vibration better—

resist fatigue to the utmost



The background at top of page shows the "Perfect" Double-Crimp Weave.

The small cuts in the center panel compare Arch-Crimp Weave and Double-Crimp Weave.

The border at foot of page shows "Perfect" Double-Crimp Steel Wire Cloth which has been hot-dip galvanized after weaving.

Samples on request.

The LUDLOW-SAYLOR WIRE COMPANY SAINT LOUIS

...Where Service Calls for
GREATER STRENGTH--DURABILITY
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LINK-BELT
STEEL CHAINS

Profit by their dependable, reliable, low-cost service . . . whether for drives, elevators or conveyors—slow or high speed operation. They are available in scores of standard types and sizes, with a wide range of attachment styles.

Like Link-Belt malleable, Promal and alloy chains, they are accepted as the recognized standard—the result of over 66 years' experience in chain making. Look for this double >——< arrow trade mark on every link. It's your assurance that you are getting genuine Link-Belt chains.

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Offices, warehouses and distributors in principal cities 8513-D

"SS" Class
Short Pitch

For medium and heavy duty drives; made with offset or straight side bars; with or without bushings or rollers.

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Long Pitch

For heavy-duty elevating and conveying work; made with plain carbon steels, or special alloys, special heat treatments, etc.

"C" Class "Combination"

For heavy-duty elevators handling sticky or semi-abrasive materials. A combination of alternate cast block links (Malleable Iron, PROMAL, or Cast Steel), and outside bar steel side bars, connected by steel pins or rivets.

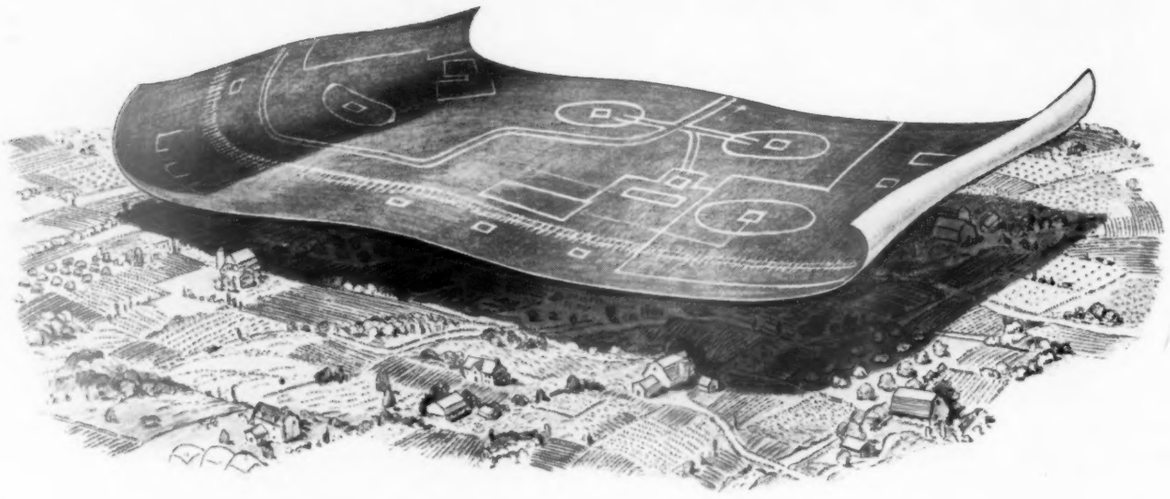
"SS" Class Without Rollers

For heavy-duty elevators and conveyors not requiring roller type chain. The shorter pitch chains are well suited and widely used for power transmission at low speeds. The hardened steel bushings minimize the wear from sprocket tooth action, and resist wear in chain joints under gritty and abrasive service.

LINK-BELT
CHAINS AND SPROCKETS
For Conveying and Mechanical Power Transmission

PIT AND QUARRY, October, 1941, Vol. 34, No. 4. Published monthly by the Complete Service Publishing Company, 538 South Clark Street, Chicago, Ill. Subscription price $1 for 1 year in the U. S. and possessions, Canada, Central and South America; elsewhere $1 additional for each year. Single copies 20 cents. Entered as second-class matter February 28, 1932, at the Post Office at Chicago, Ill., under the Act of March 3, 1897.

Where Stood 200 Farms—



A Gigantic Ordnance Project is Now in Operation

As you read this, thousands of men and women are loading shells and bombs for America's defense—in a 40-square-mile area where, a year ago, two hundred farmers were peacefully tilling their fields.

This area is the Ravenna Ordnance Plant. It was built by general contractors. It is owned by the Government. Atlas Powder Company has been designated to operate the plant for the Government.

For months, Atlas has been training and organizing personnel to do a competent job—and to provide for the health, safety and comfort vital to efficient operation. But Ravenna, though the largest, is but one of Atlas' Defense operations.

Great Government-owned plants for making TNT and DNT are nearing completion at Weldon Spring. They will be operated by Atlas for the Government. At another point, an Atlas plant has been producing TNT for over two years. Still another works has been fulfilling TNT contracts for Britain for over a year. Two Atlas-owned loading plants are operating and, finally, another Atlas plant is devoted to making Black Powder Spotting Charges.

Atlas, of course, is essentially a manufacturer of peacetime products. Because munitions require entirely different equipment and materials, commercial explosives plants are neither suitable nor convertible to military use. However, Atlas has retained the art, science and engineering skill so important in munitions operations and has turned them to account in these new Defense projects.

At the same time, Atlas' regular products enter directly or indirectly into Defense activity in other industries. Explosives are "musts" for construction, mining, quarrying. Chemicals, carbons, finishes are required for countless industrial uses.

Atlas' duty, then, is to carry both loads. To do this demands tremendous effort on our part, with hundreds of veteran employes assigned to new duties, and with thousands of new men and women employed. We know that our customers likewise are doing their part. They recognize, as we do, the necessity that all hands pull together to solve Industry's problems and provide the Nation with the Defense materiel it needs today.

ATLAS EXPLOSIVES *"Everything for Blasting"*

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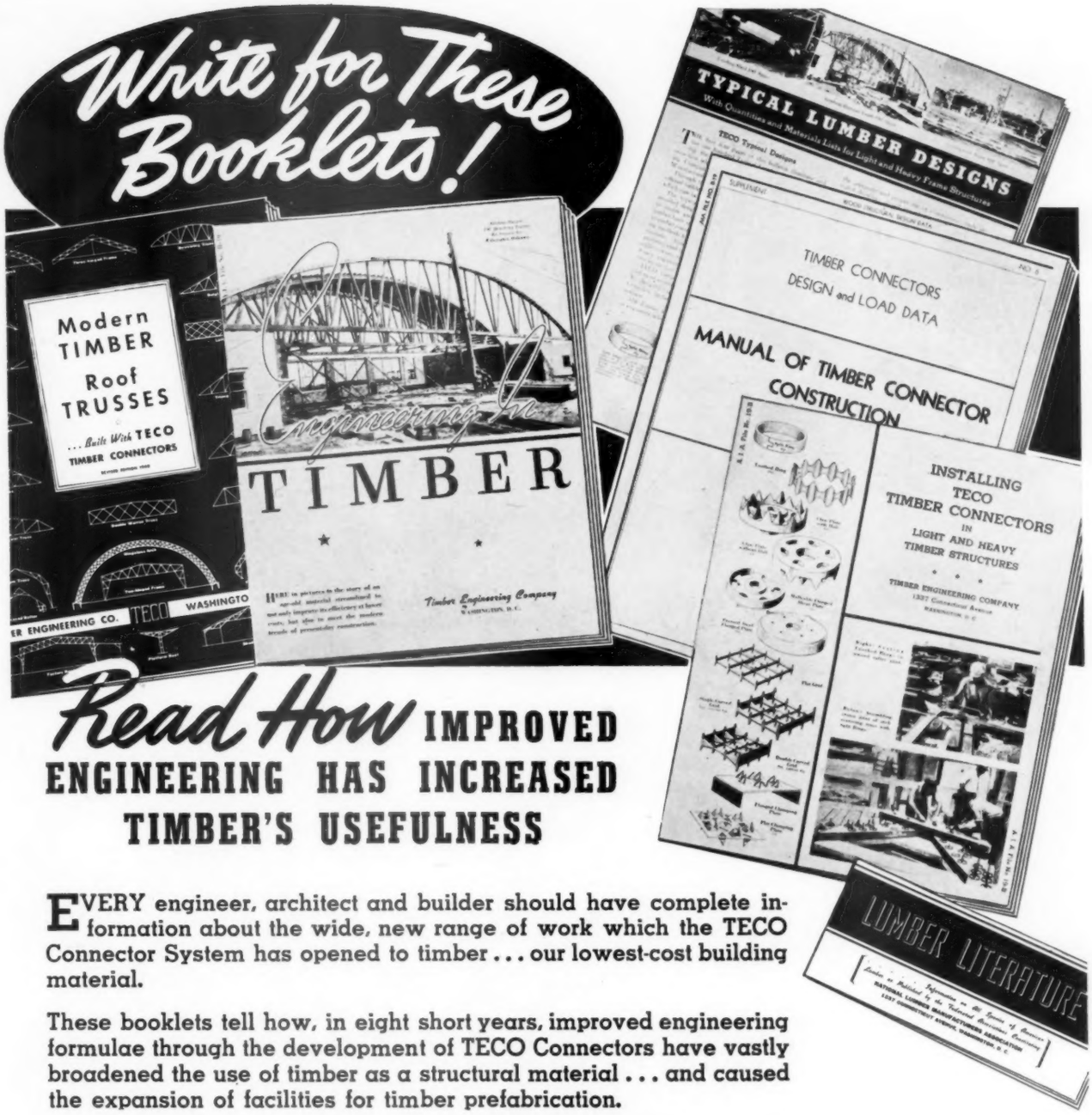
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DESIGN and LOAD DATA
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Timber Engineering Company, Inc., Dept. AK-10
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☐ "Lumber Literature". (Catalog of all Lumber Literature)

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Street .....

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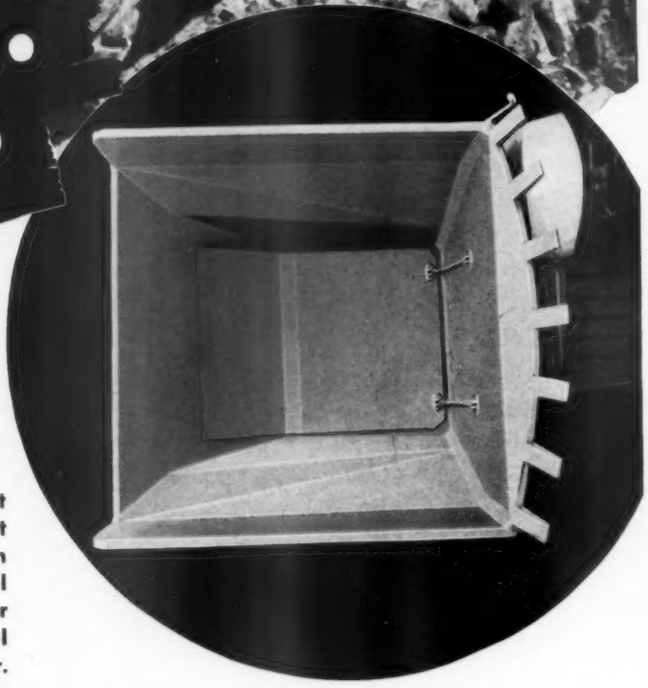
Easy Spotting Big Body...

FOR HIGH SPEED LOADING



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More loads per hour means more yardage per shift . . . and production is what counts today! And that is why the KOEHRING DUMPTOR can help you on those tough schedule jobs. Short wheelbase and full forward operator vision makes it easy to maneuver in tight spots, close to the shovel. That cuts shovel swing time for more passes of the dipper per hour. Wide body top opening makes it easy to spot the dipper load. That saves more time. And then the full speed reverse gets the Dumptor away from the shovel without delay . . . speeding on its way to the fill. *Seconds are saved with every move . . . you get more loads per hour with the KOEHRING DUMPTORS!*

KOEHRING COMPANY • *Milwaukee, Wis.*

Wide body top opening permits instantaneous dumping from the shovel dipper, for more loads per hour . . . more yardage per shift . . . lower hauling costs with the KOEHRING DUMPTOR.

KOEHRING HEAVY DUTY

HEAVY-DUTY CONSTRUCTION EQUIPMENT

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"Bridges a Century with Wire"

ROEBLING WIRE ROPE AND STRAND • WIRE ROPE SLINGS AND FITTINGS • SUSPENSION BRIDGES AND CABLES • AERIAL WIRE ROPE SYSTEMS • ELECTRICAL WIRES AND CABLES • HIGH AND LOW CARBON COLD ROLLED STRIP • ROUND AND SHAPED WIRE WIRE CLOTH AND NETTING • STEEL AND COPPER RODS • HIGH AND LOW CARBON ACID AND BASIC OPEN-HEARTH STEELS

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» » In celebrating its 100th Anniversary, Roebling looks forward to the opportunity of serving industry in even greater measure than ever before.

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OFF AGAIN, ON AGAIN, DRILL AGAIN,

FINNIGIN

Section Foreman Finnigin's telegram "Off again, on again, gone again—Finnigin" was a vivid report of a difficult job with the fewest possible words.

If his cousin, Finnigin the drill runner, were to report to his boss on Timken Bits he, too, could vividly describe their performance in a very few well-chosen words . . . "off again, on again, drill again—Finnigin."

To the quarry operator who is still using bits forged as an integral part of drill steel, thereby paying unnecessary steel handling costs and yet obtaining less footage per hour, we merely ask him to "think" about the phrase "off again, on again, drill again." It has a lot of ramifications all pointing to faster, cheaper drilling. Just write, we will tell you about them in detail.

THE TIMKEN ROLLER BEARING COMPANY, CANTON, OHIO

OFF AGAIN

ON AGAIN

DRILL AGAIN

TIMKEN

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MAKING A 3/4 INCH PRODUCT FROM AN 8 INCH FEED OF TRAP ROCK

The coarse feed and fine product from the 4 1/4 foot Symons Cone Crusher.

Here is another outstanding example of Symons Cone Crusher performance. As with most quarries in North Jersey engaged in crushing trap rock, the Orange Quarry Company of West Orange uses Symons Cones for reduction crushing. The satisfactory performance of a 4 foot Cone, installed in 1935, led to the installation of a second Cone, a 4 1/4 foot with coarse bowl suitable for reducing the material from the primary jaw crusher. This Cone takes a feed of 6 to 8 inches and makes a minus 3/4 inch product. The Symons 4 1/4 foot followed by a Short Head Cone is the ideal combination for producing finely crushed materials in big capacity and at low cost.

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Brooks LOAD LUGGER

Trade Mark Registered

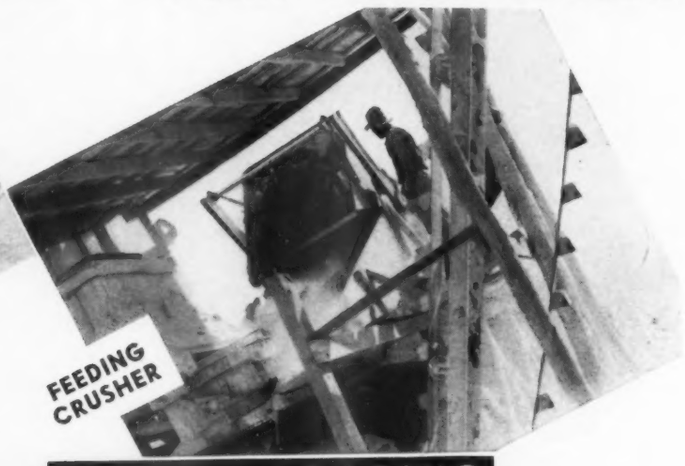
Legions of LOAD LUGGERS are serving in defense work and aiding industry in the greatest production speed-up efforts of all time. **They're enlisted for the duration!**

The "All-American"

Multiple Bucket Type

DUMP TRUCK SYSTEM

QUARRY OPERATIONS



FEEDING CRUSHER

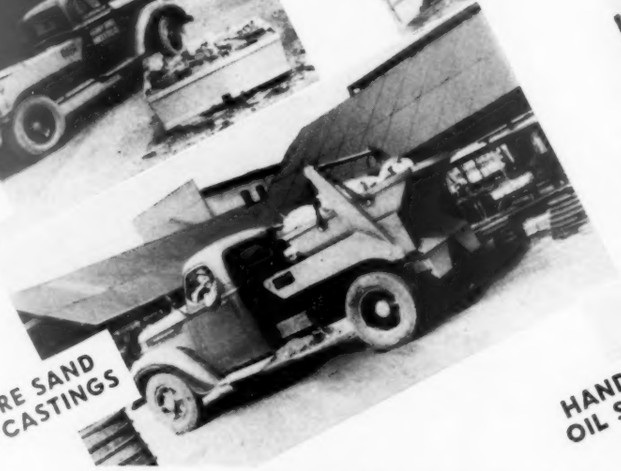
Wherever LOADING IS DONE BY HAND

ROAD WORK

BRIDGES AND DAMS

TILE AND BRICK

LOADING OPEN CARS



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HANDLING OIL SLUDGE

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Brooks EQUIPMENT AND MFG. CO.

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Distributors in all Principal Cities

Knoxville, Tennessee

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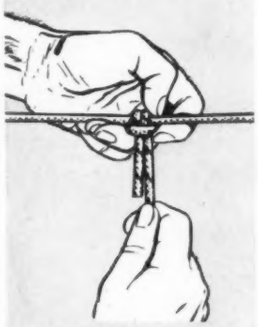
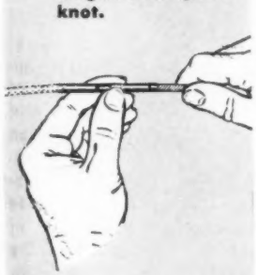


2. Half hitch branch to main line.

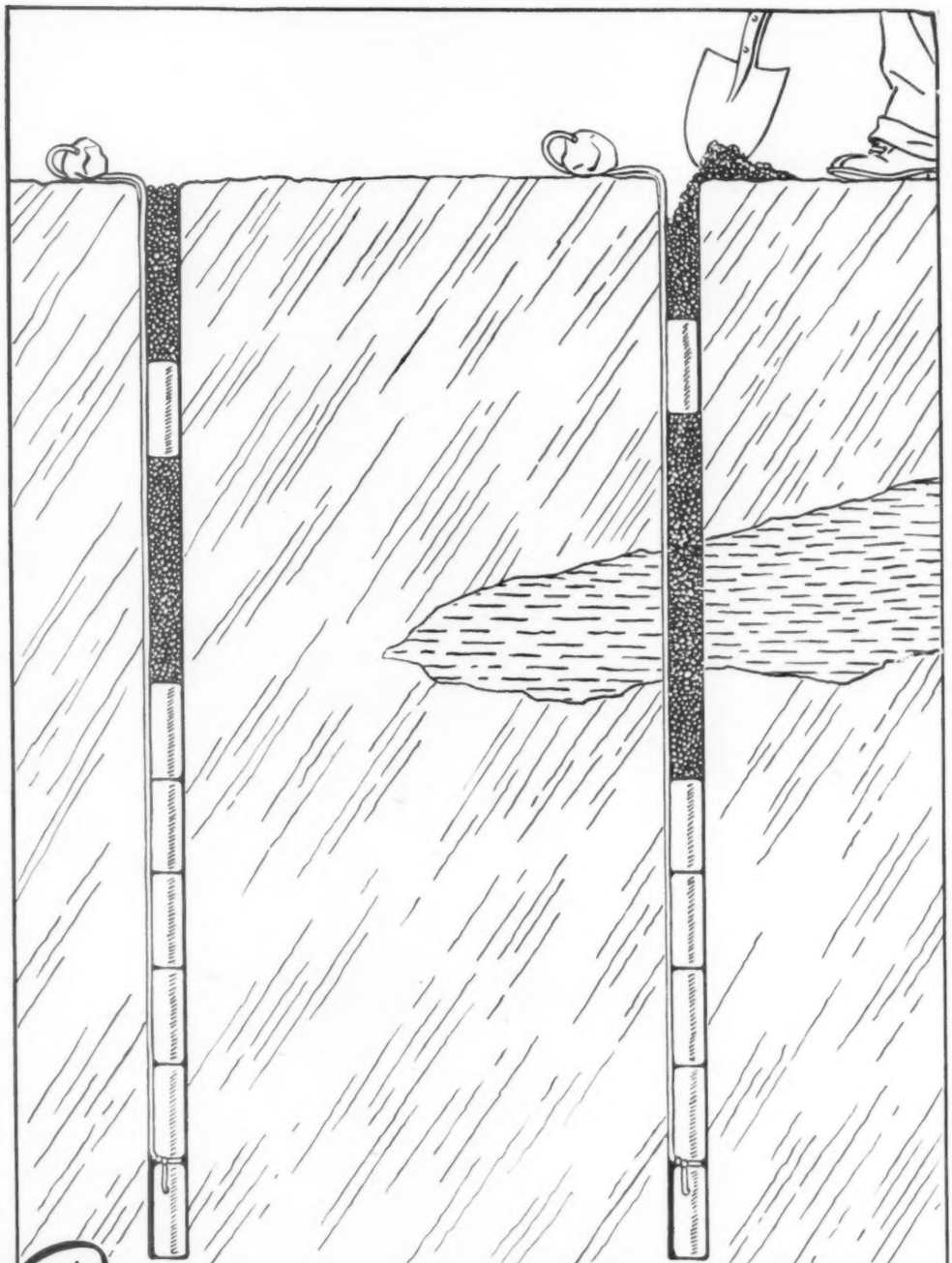
3. Connect main line lengths with *square* knot.



4. Fuse and cap on end of main line.

IMPORTANT

Branch lines should lead away from main lines at *right angles*. Avoid kinks and small loops.



Deck Loading Simplified

When deck loads are advisable, you can make them without extra caps or labor—when you detonate with Primacord.

Why? Because each cartridge in the hole is detonated directly by the Primacord and will "go" with the force of a primer cartridge, even when charges are "broken." Send for the Primacord Booklet—it's free.

PRIMACORD BICKFORD
Detonating Fuse

PB-37

THE ENSIGN-BICKFORD COMPANY • SIMSBURY, CONN.

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The compilers of the 1941 Directory Section of Pit and Quarry Handbook have labored painstakingly to build an accurate list of all known American producers of nonmetallic minerals. Each new listing has been carefully scrutinized for accuracy and completeness. Previous listings have been revised, checked, double-checked. All appear two ways—(1) alphabetical by companies, (2) geographical by plants. It gives you company names, officers, location of plants, size or capacity, and names of the men who do the buying. Select the complete Handbook and Directory, or the convenient, flexibly-bound Directory alone. Now ready for distribution. Order NOW to insure getting one of the first copies. Use coupon below . . . we'll bill you after you get the book.

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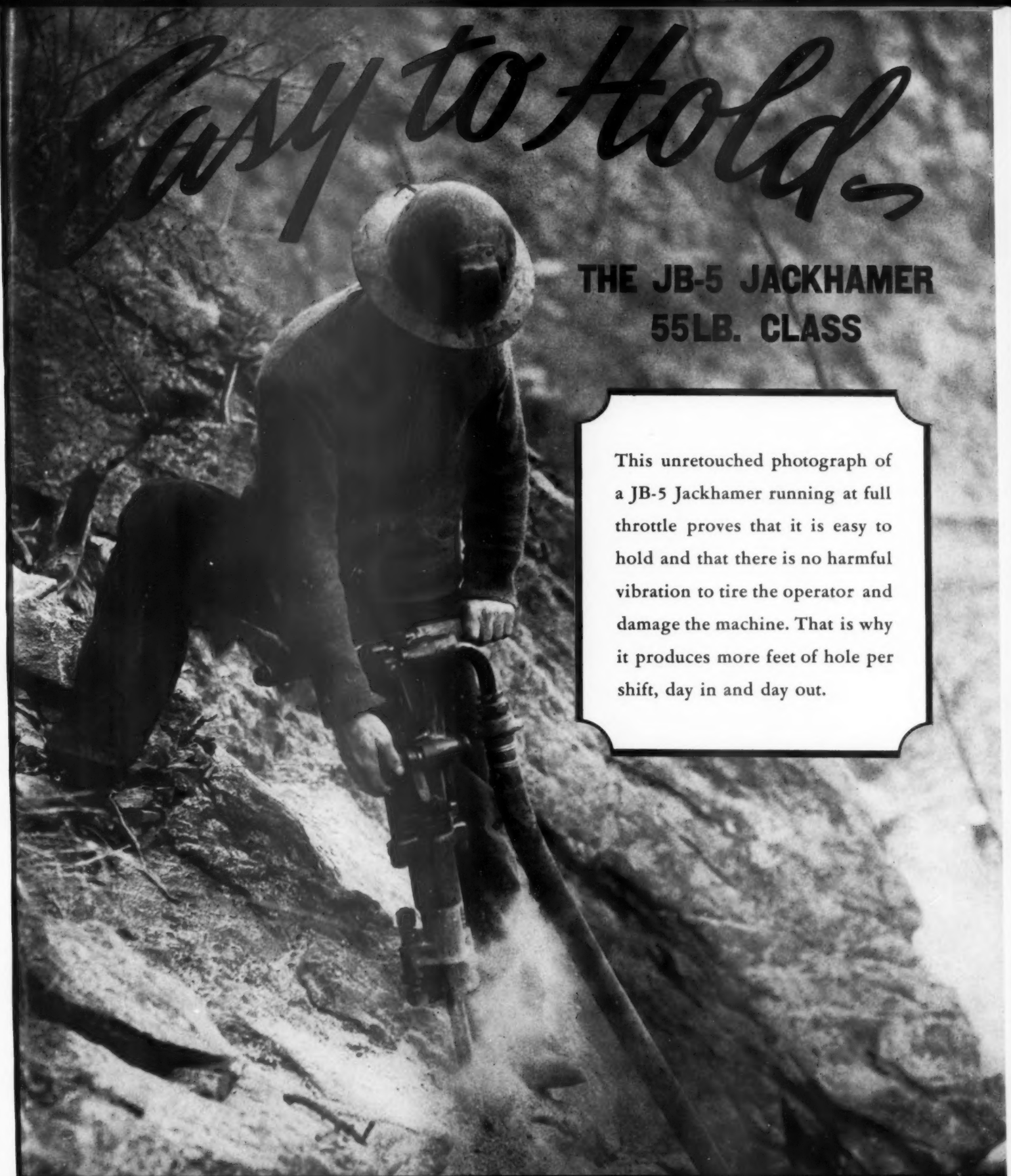
Easy to Hold
THE JB-5 JACKHAMER
55LB. CLASS
This unretouched photograph of a JB-5 Jackhamer running at full throttle proves that it is easy to hold and that there is no harmful vibration to tire the operator and damage the machine. That is why it produces more feet of hole per shift, day in and day out.

SOLVE YOUR DRILLING PROBLEMS WITH IR JACKBITS

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5-88

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for

✓ base course,
✓ aggregates,
✓ chips,

at the lowest cost per yard

Top: Flash-production of defense road materials is provided by H. E. Sargent's Universal Gravelmaster Plant at Lamoine, Maine.

Bottom: J. A. Terteling & Sons' Universal Gravelmaster Plant produces aggregates for the 10 million dollar Umatilla Ordnance Project near Hermiston, Ore.

it's UNIVERSALS from Coast-to-Coast!

Yes, from Maine to Oregon, profit-proved Universal Crushers and Crushing Plants are getting out crushed rock and gravel for highway departments and contractors at the lowest cost per yard. That's why Universals were chosen and that's why users buy additional Universals when needed—because they turn out more material, faster, and at a lower cost per yard. "Excess baggage" has been eliminated—conveying cycles shortened, crushers weigh less yet are of high capacity. Then, too, a network of dependable dealers make it easier to get service on Universals—what little is needed.

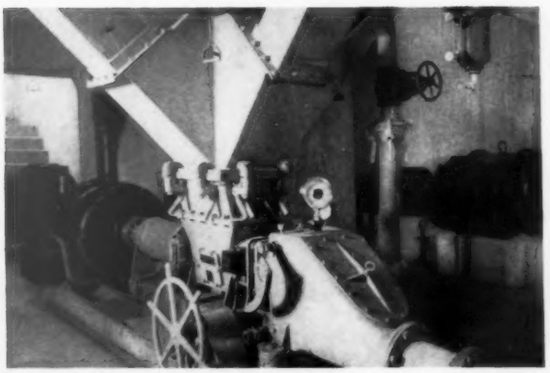
Ask about production costs in any pit or quarry using Universal Equipment — check fuel consumption, bearing life, maintenance costs and other operating factors that affect profits and you'll find out why Universals are so prevalent from coast to coast—yes, and from Alaska to the Isthmus, too!

Universal's new "Twin Dryer" Asphalt Plant provides a new all-time "low cost" in hot patching material and small asphalt paving jobs!

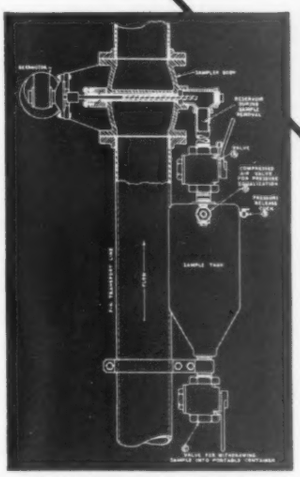
UNIVERSAL CRUSHER COMPANY, 619 C Ave. West, Cedar Rapids, Iowa

UNIVERSAL

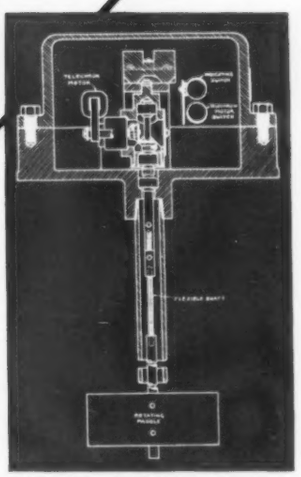
CRUSHERS, PULVERIZERS, COMPLETE PLANTS, SPREADEROLLERS, PORTABLE ASPHALT PLANTS



Fuller-Kinyon Conveying Systems, built in both stationary and portable types.



Fuller-Anderson Sampler for continuous sampling of dry pulverized materials.

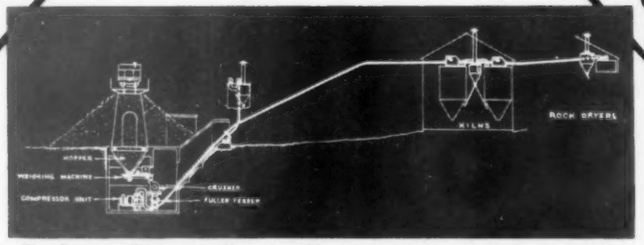


Material-Level Indicator, for controlling high and low-level limits of material in bins.

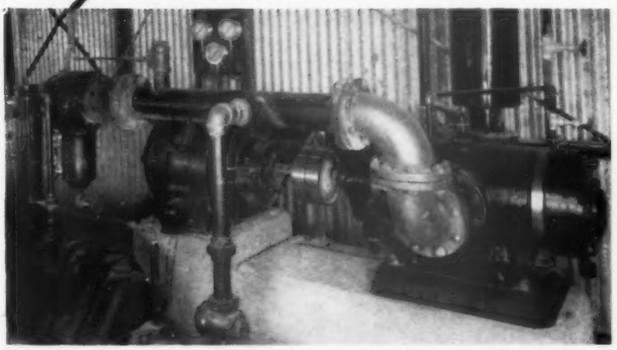
COST SAVING EQUIPMENT FOR THE CEMENT PLANT BY FULLER

Fuller Rotary Feeder for dry pulverized materials.

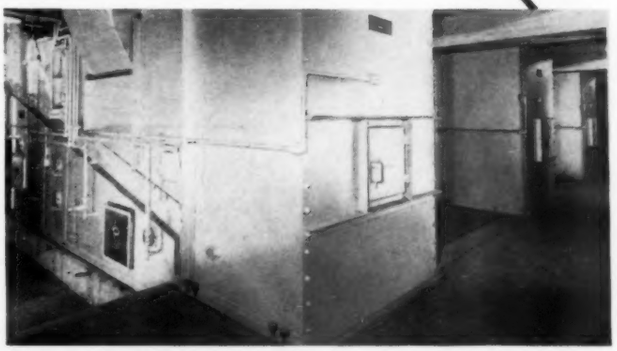
Fuller Rotary Gate Valve.



The Airveyor Pneumatic Conveying System, conveying crushed coal to kilns and rock dryers.



Fuller Rotary Compressors, built in single and two-stage types, capacities to 1800 C.F.M., 125-lb. pressure.



Fuller Air-Quenching Coolers for clinker, lime, ores, and other similar materials.

FULLER COMPANY - CATASAUQUA, PA.

CHICAGO—Marquette Bldg. SAN FRANCISCO—Chancery Bldg. G-21

Make BETTER PRODUCTS Cost Less

CLAY

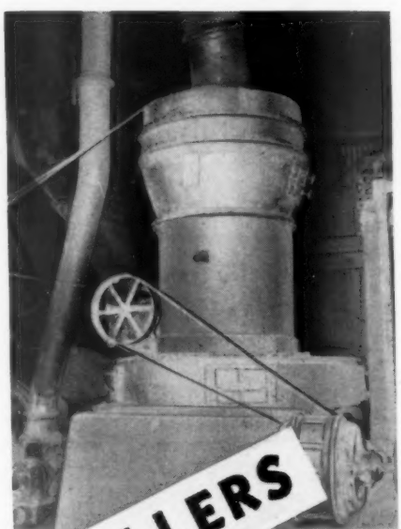
Drying clay and reducing it to a fine, dry, uniform powder.

RAYMOND ROLLER MILLS

continue to set the standard for low cost grinding and wide range application. They keep ahead by constant improvements. Such features as Air Separation, Pneumatic Feed Control, Oil Journals, Air Drying System, Automatic Throw-out Attachment, and Whizzer Type Separators, are all original Raymond developments that simplify production and save on operating costs.

Ask for further details

SINCE 1887



FILLERS

Drying and grinding limestone screenings for producing several grades of material.

WHITING

Pulverizing and separating chalk for whiting used in putty, pigments and fillers.

AGSTONE

Drying and grinding dolomitic limestone to minus 100-mesh fineness for agricultural limestone.

RAYMOND PULVERIZER DIVISION
COMBUSTION ENGINEERING COMPANY, INC.
1321 North Branch Street **CHICAGO**
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DEC 19 1941

PIT AND QUARRY

Vol. 34 OCTOBER, 1941 No. 4

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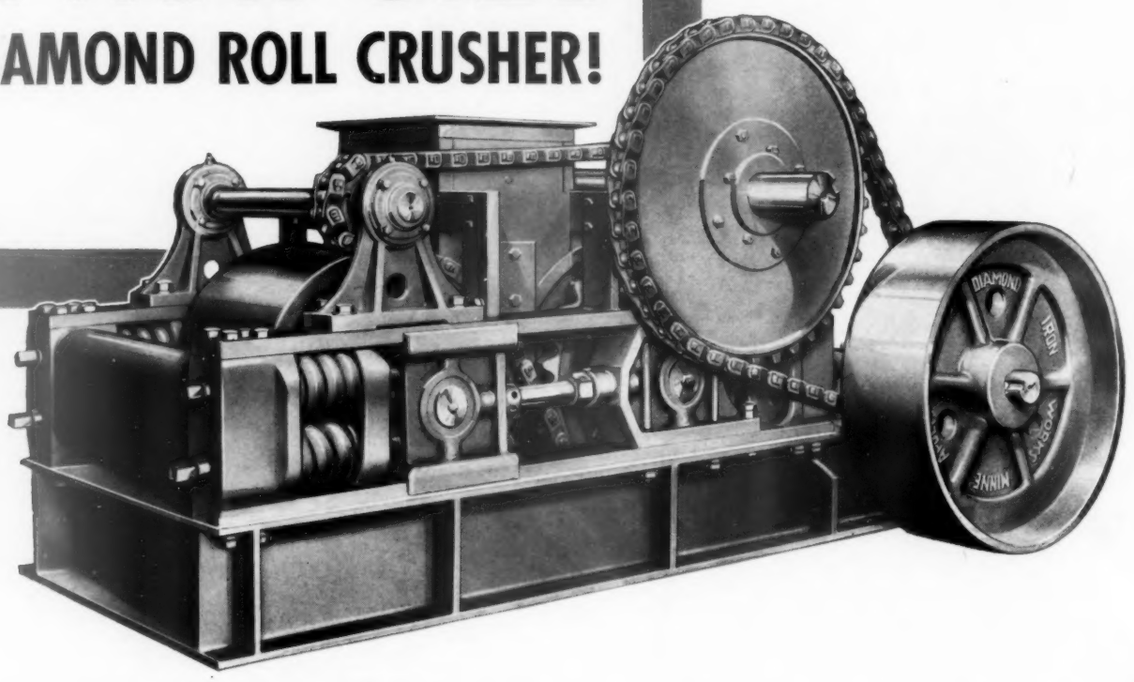
54" x 24"
A NEW SIZE
DIAMOND ROLL CRUSHER!



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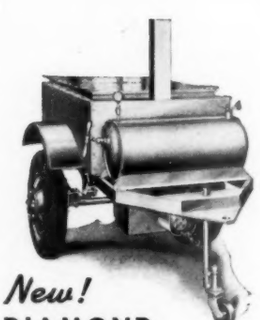

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PIT AND QUARRY

CHICAGO OCTOBER, 1941

CIO Agreement Ends Strike at 17 U. S. Gypsum Co. Plants

The Defense Mediation Board has announced that a C.I.O. union has agreed to end a strike in 17 plants of the United States Gypsum Company.

Board officials said that the Gas, By-Products, Coke and Chemical Workers Union (C.I.O.) said it was notifying 3,000 employees on strike to return to their jobs at once.

The board had asked the union to end the stoppage in the interest of national defense. In so doing the board promised that a special representative would be appointed to investigate four unsettled issues in the dispute.

The strike had been in effect since June 26, and officials said that it had tied up about 40 per cent. of the total national output of gypsum, plaster and wall board necessary for defense housing.

Blue Diamond Erecting Gypsum-Products Plant

A $700,000 plant for the production of gypsum products is being built by the Blue Diamond Corporation of Los Angeles at its gypsum mine near Arden, Nevada.

Formerly the crushed crude was shipped from the mine to the company's plant at Los Angeles where it was processed and utilized in the manufacture of gypsum products.

Work on the new plant is just getting under way with completion set for some time in the winter. Irving E. King, mine superintendent, will also be in charge of the new plant.

Private Capital Builds New Puerto Rico Plant

A privately-financed Puerto Rico concern, the Ponce Cement Corporation, is building a wet-process Portland cement plant which will have a capacity of from 2,500 to 3,000 barrels per day. A. P. Hachtman of Allentown, Pennsylvania has been retained as consulting engineer.

The kilns will be oil-fired. The plant proper is being built by the Puerto Rico Iron Works. The McDonald Engineering Company of Chicago will build the storage silos.

2 Killed in Premature Blast at Lime Quarry

Two workmen, Monroe Graybeal, 28, and Elbert Brewster, 35, were killed and a number of others injured on August 28 in a premature blast at the quarry of the Blue Grass Lime Company, near Maxwell, Virginia.

The accident occurred, according to press reports, while holes were being loaded preparatory to a blast.

Repair Damage Caused by Boiler Explosion

Employees of the Fenton, Michigan plant of the Aetna Portland Cement Company, went back to work recently after a two-months' lay-off, necessitated because of repairs to damage which resulted in a boiler explosion in June.

Several men were burned in the explosion but all have recovered.

Coming Events

January 28-30, 1942—Cincinnati. Annual conventions, National Sand & Gravel Association, and National Ready Mixed Concrete Association. Netherland Plaza Hotel.

February 2-5, 1942—Cincinnati. Annual convention, National Crushed Stone Association. Netherland Plaza Hotel.

Trinity, Lone Star Share Panama Canal Cement Contracts

The Panama Canal Commission, Washington, D. C., has awarded a $5,400,000 contract for supplying 4,000,000 barrels of Portland cement for the third set of locks for the Panama Canal to the Trinity Portland Cement Company, and a $2,790,000 contract for supplying 2,000,000 barrels to the Lone Star Cement Corporation.

The letting is said to be the largest of record.

Carney Adds Cupola at Rock-Wool Plant

Equipment for a new cupola to be added to the Carney Company's mineral-wool plant at Mankato, Minnesota, has been ordered, H. E. Carney, Jr., company president, reports. The new unit will be installed to meet the increased demand for insulation.

The unit will be 50 inches in diameter and an exact duplicate, except for a few minor improvements, of the present one.

Another improvement at the plant has just been completed, Mr. Carney points out, with the installation of a new sizing conveyor and oven which will more accurately fabricate all industrial and domestic batts.

Since the original plant was built there has been a continuous program of expansion in both equipment and organization. The company now employs 42 persons, and it is estimated that the installation of the new cupola will increase the plant force by eight or 10 men.

Lime Prices Exhibit Rise at Kansas City

The Stewart Sand & Material Company of Kansas City has been awarded a contract to supply 500 tons of lime to the Kansas City water department on its low bid of $9.05 per ton.

Last year the company furnished the material for $6.79 per ton.

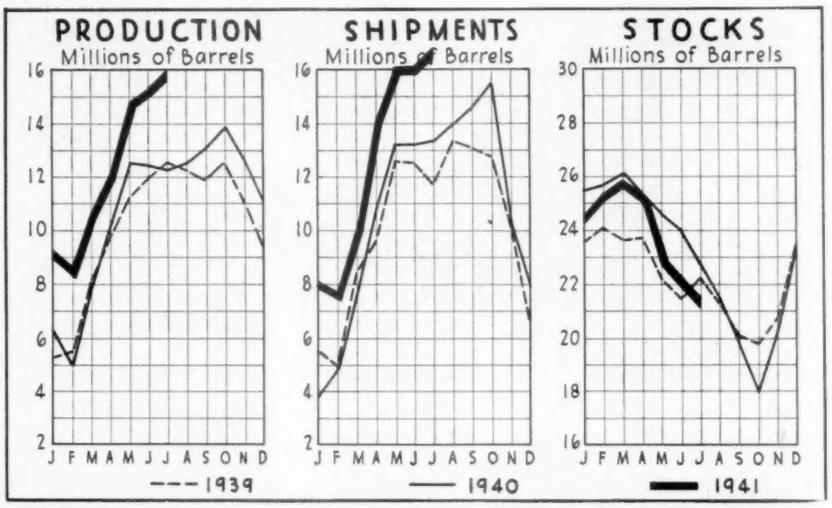
Maritime Commission to Build Big Fleet of Concrete Barges

The U. S. Maritime Commission has decided to build about a hundred reinforced-concrete oil barges of 5,000 to 8,000 tons capacity. This, it is believed, will use only about half the steel which would be required for a similar capacity in a steel barge. Moreover, reinforcing rods are rather less scarce than steel plates.

Interested contractors have been asked to submit bids and designs on one to thirty barges. The commission has not made any detailed designs, but has prepared certain broad requirements for the guidance of contractors.

Three types of barge are to be built. Two are of conventional ship shape, with and without crew facilities and steerable rudder. The third is a cigar-shaped vessel of oval cross-section with conical ends. Hulls must be substantially monolithic. No transverse joints are to be permitted, and prefabrication will be allowed only in the deckhouse structures, not in the hull.

A concrete with a 28-day strength of 5,000 pounds compressive strength is specified, with reinforcement stresses limited to 12,000 p.s.i. in areas where cracking might cause seepage and 20,000 p.s.i. elsewhere. Waterproofing surface treatment will be applied to the concrete.



The Portland-cement industry in July, 1941, produced 16,000,000 barrels, shipped 16,687,000 barrels from the mills, and had in stock at the end of the month 21,178,000 barrels of cement, according to the Bureau of Mines. Production and shipments in July, 1941, showed increases of 30.2 and 24.1 per cent., respectively, as compared with July, 1940. Portland-cement stocks at mills were 7.3 per cent. lower than a year ago.

Gold Is By-product of Shasta Gravel Plant

Although erected primarily to produce aggregates for the building of Friant Dam, the plant at Redding, California, is producing considerable gold as a by-product. A check in the amount of $37,993 was recently tendered the United States Bureau of Reclamation as its share of the gold recovered.

Gold to the amount of $94,520 was recovered from August, 1940, to June 30 of this year—a monthly average of almost $10,000. The expenses incurred in the process of recovering the precious metal amounted to $18,534, the cost of constructing the by-product plant for these operations being included.

The contractor turned half of the net proceeds over to the Bureau of Reclamation in conformance with an agreement with the bureau.

Buffalo Seeks Quarry for Municipal Dump

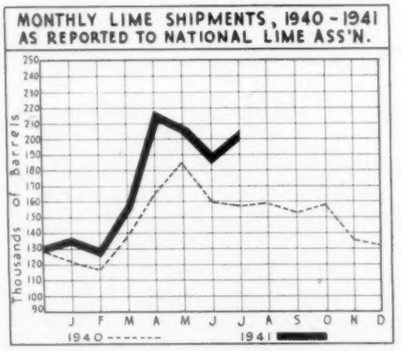
Provided it can be acquired by the city for $100,000, Mayor Thomas L. Holling of Buffalo has expressed willingness to approve the purchase of a 50-acre abandoned quarry in North Buffalo for use as a depository for ash collection. The owner, the Buffalo Crushed Stone Company, previously had offered the quarry land for $165,000, or $9,000 less than the present assessed valuation. The quarry operations were abandoned eight years ago.

Lime Association Names 4 District Directors

Subsequent to the recent Hot Springs convention the election of National Lime Association directors in Districts 2 and 3 has been completed with the following results:

District 2: H. D. Brigstocke, Thomasville Stone & Lime Company, and B. L. Corson, G. & W. H. Corson, Inc.

District 3: A. B. Miner, National Gypsum Company, and Ralph Dickey, Kelley Island Lime & Transport Company.



According to data collected by the National Lime Association, 69 companies in July, 1941, shipped 203,931 tons of lime (122,084 quicklime; 81,847 hydrate). Reporting companies represent 51.3 per cent. of the association's total capacity of record. Based on PIT AND QUARRY'S estimates for the remainder of the industry the total shipments for the month are estimated to have been approximately 400,000 tons. Shipments of lime by use and grade for July, 1941, were:

Use	Quicklime (tons)	Hydrate (tons)
Agricultural	774	7,919
Building	21,800	46,325
Chemical	99,510	27,603
Total	122,084	81,847

The Metropolitan Sand & Gravel Company of Denver uses this LeTourneau Carryall scraper drawn by a Caterpillar tractor for stripping its deposit and for hauling gravel to a pit trap at the plant.

Cement, Quarry Heads to Discuss Safety at Chicago Congress

As usual, the Cement and Quarry Section will have a prominent part in the annual National Safety Congress, meeting this year on October 6 to 10 at the Hotel Stevens, Chicago. The Section's meetings are scheduled for Wednesday and Thursday, October 8 and 9. Here is the program:

WEDNESDAY AFTERNOON

Report of General Chairman.

R. A. Dittmar, Plant Manager, Universal Atlas Cement Co., Hudson, New York.

Cement and Quarry Accident Experience.

I. F. LeGore, Safety Engineer, Portland Cement Association, Chicago.

How to Get and Keep Safety Interest.

Panel discussion, with Austin B. Cox, Director, Industrial Relations, Pennsylvania-Dixie Cement Corporation, Nazareth, Pennsylvania, presiding. Participants will include: Edward Gustafson, repairman, Petoskey Portland Cement Company, Petoskey, Michigan; F. L. Maus, Safety Director, Alpha Portland Cement Company, Easton, Pennsylvania; W. B. Russell, Assistant Secretary, Peerless Cement Corporation, Detroit.

How to Reach the Man on the Job.

Panel discussion, with M. P. Greer, Safety Engineer, Marquette Cement Manufacturing Company, Cape Girardeau, Missouri, presiding. Participants will include: Claude L. Baylor, Personnel Director, Louisville Cement Corporation, Speed, Indiana; F. J. Buffington, Safety Engineer, New York Trap Rock Corporation, New York City; S. L. Greenawalt, Safety Director, North American Cement Corporation, Hagerstown, Maryland.

THURSDAY LUNCHEON

Frank T. Sheets, President, Portland Cement Association, Chicago, will preside. The address will be by Dr. Charles Copeland Smith, National Association of Manufacturers, New York City.

THURSDAY AFTERNOON

Election of 1941-42 Officers.

Executives Look at the Safety Program.

Panel discussion with O. M. Graves, President, General Crushed Stone Company, Easton, Pennsylvania, presiding. Participants will include: John J. Porter, President, North American Cement Corporation, New York City; and J. S. Young, President, Lehigh Portland Cement Company, Allentown, Pennsylvania.

Abrasives Plant Is Damaged by Blaze

Fire destroyed a large part of the Blasdell, New York plant of the Exolon Company, producer of abrasives, causing damage estimated at hundreds of thousands of dollars in addition to loss of "use and occupancy."

The fire, which occurred on August 19, halted all production, 80 per cent. of which had been for defense orders. Large orders were on hand for silicon-carbide and aluminum-oxide abrasives, used in many defense industries for grinding wheels and for refractory purposes. Built in 1914, the plant was the country's largest aluminum-oxide processor and the second largest for silicon carbide.

Administrator Clears Up Bonus Status as It Affects Wages

A statement defining bonuses which do not affect overtime payments has been issued by General Philip B. Fleming, Administrator of the Wage and Hour Division, U. S. Department of Labor. The test of such a bonus is that the payment and amount are solely in the discretion of the employer. The employee has no contract rights, expressed or implied, to any amount.

"At the time the Fair Labor Standards Act of 1938 went into effect the Wage and Hour Division took the position that production bonuses were part of an employee's pay and should be included in the computation of overtime," General Fleming said. "That is still the position of the Division. The Division later said that unless it could be conclusively demonstrated that any payment was a gift or a gratuity, such a payment must be added to the 'regular rate of pay' on which the time and a half for overtime is computed.

"Some employers have written us that they were hesitating about giving their employees bonuses from their currently enlarged earnings. So we are issuing this statement to dispel doubts.

"The statement also defines the type of bonus which affects the regular rate of pay and shows how such bonuses are to be computed in arriving at overtime compensation. It also warns that weird 'bonus' schemes for the evasion of overtime payments will not be countenanced by the Division in its enforcement of the Act.

A recent aërial photograph of the plant of the Diamond Portland Cement Company at Middlebranch, Ohio. At the right is the clinker-storage building, the newest addition to the plant. At the time the storage building was built, new clinker-cooling and crushing equipment was also installed. The six cement-storage silos at the left, with a capacity of 60,000 barrels, were built last year.

Seasonal Exemption Denied Crushed-Stone Operator in Oregon

Denial of an application of the City Motor Trucking Company of Portland, Oregon, for a seasonal exemption from the 40-hour week for excavating, hauling and processing of crushed stone is indicated in a notice issued by General Philip B. Fleming, Administrator of the Wage and Hour Division.

The National Crushed Stone Association had filed an application on behalf of the City Motor Trucking Company for inclusion of its operations within the 14-week seasonal exemption extended to crushed-stone operators whose season is limited by frost. Notice of a preliminary determination including the plants of the City Motor Trucking Company within the Northern branch of the crushed-stone industry was issued in January, 1941. Objection to granting the exemption was entered by the Building and Construction Trades Council of Portland and Vicinity. A hearing on the application and objection was held in Portland before Harold Stein of the Hearing Branch of the Wage and Hour Division. In denying the application, on the basis of evidence presented at the hearing, Mr. Stein determined that:

"(a) These plants (City Motor Trucking Company) do not regularly shut down substantially for 6 months during each year nor do they regularly cease operations completely for 5 months of each year.

"(b) Although these plants cease operations during a part of each year this cessation of operations is not caused entirely by climatic or other natural conditions but is in part the result of lack of demand for the company's products."

Phosphate Shipments Up Despite Lack of Exports

Notwithstanding a great decrease in exports as a result of the blockade of Europe, shipments of phosphate rock from American mines were larger in the first half of 1941 than in like periods of former years since 1937, the first year for which semi-annual statistics are available. Owing to heavy demand from the Agricultural Adjustment Administration and the Tennessee Valley Authority, domestic consumption during the current year is likely to be much greater than ever before. Distribution of fertilizer by government agencies increased rapidly to almost a half million tons in 1940 or 5.66 per cent. of the gross tonnage and 9.68 per cent. of the plant-food content of all fertilizer consumed in that year. Higher shipments are forecast for 1941.

Shipments of domestic phosphate rock during the first half of 1941 were 19 per cent. greater than during the similar period of 1940 according to reports of producers to the Bureau of Mines. Total shipments from American mines for the first six months of 1941 rose to 2,097,794 long tons valued at $6,738,529 compared with 1,766,732 tons valued at $5,352,009 for the like period of 1940, with an increase in average value, possibly due to the increased exports from $3.03 in 1940 to $3.21 in 1941. Total stocks in producers' hands at the end of June 1941 were slightly greater than at midyear in 1940, the increase in Tennessee more than counterbalancing a decline in stocks in Florida.

Ahearn, Boyd Elected Officers of A.T.A.E.

A more rapid trend away from the "guns-and-butter" effort toward a wholly defense economy was forecast at the annual convention of the American Trade Association Executives held September 13 at Hershey, Pennsylvania.

The pit-and-quarry industries were prominently represented at the convention, which elected V. P. Ahearn, executive secretary of the National Sand & Gravel Association, to a vice-presidency, and named J. R. Boyd, administrative director of the National Crushed Stone Association, as treasurer of the group.

August Construction Highest on Record

Building and engineering contracts awarded during August, 1941, totaled $760,233,000 and were, according to F. W. Dodge Corporation, higher than for any other month recorded in its record of construction in 37 Eastern States.

This dollar volume was 84 per cent. greater than the $414,941,000 awarded in August, 1940, and 14 per cent. greater than the $667,097,000 awarded in May, 1928, which was the previous highest month on record.

Fire Destroys Illinois Sand-Drying Plant

Fire caused about $10,000 damage when it destroyed the sand-drying plant owned by the E. J. Reynolds Sand Company near Utica, Illinois, recently. The plant was being operated under lease by the American Silica Sand Company of Ottawa, Illinois.

Burning timbers fell on the right-of-way of the Rock Island railway and held up passage of the "Rocket" streamliner for an hour.

Defense Demands in Buffalo Area Keep Cement Plants Busy

Defense demands for cement have lifted production of the two Buffalo area cement manufacturers to the highest point since 1929. Inventories are being reduced because sales are exceeding production schedules which are on a basis of about 8,000 barrels a day.

About 65 to 70 per cent. of the output of Buffalo cement mills is being used for defense, including drydocks, naval work, armament plants, military air fields, housing and new defense highways.

"All four kilns are being operated for the first time since 1929," said an executive of the Great Lakes Portland Cement Corporation recently. "Three shifts are working seven days a week to produce our capacity of 5,000 barrels of cement every 24 hours. This is an increase of about 1,500 barrels a day from a year ago."

An executive of the Federal Portland Cement Company said that about 3,000 barrels of cement are being made in two kilns. Three shifts are being employed on a seven-day week schedule.

Riverside Improving Plant at Crestmore

Numerous improvements are being made at the Crestmore plant of the Riverside Portland Cement Company of California, according to Superintendent Howard R. Starke.

Two 125-foot kilns, moved to Crestmore from the Oro Grande plant, are being equipped with Fuller clinker coolers. A 7- by 26-foot Allis-Chalmers tube mill has also been moved to Crestmore from the Oro Grande plant. A Marcy mill, 10 feet in diameter by 9 feet long, has also been purchased and installed at the Crestmore plant.

Use Concrete Instead of Steel for Gas Holder

To reduce the use of steel normally required in such construction, the new 10,000,000-cubic foot gas holder of the Southern California Gas Company, at Los Angeles will use a concrete pit. The contract for the design and construction of the huge holder has been awarded to the Bartlett-Hayward Division of the Koppers Company. It will rise 190 feet above the ground, will be 273 feet in diameter, and will consist of five lifts operating from a 38-foot pit. Concrete will be used for pit construction, replacing the usual 2-inch steel plate.

Defense-Highway Construction.—Construction of roads of special importance to the national defense will be expedited through granting of the preference ratings provided for recently by the OPM's Priorities Division, the Public Roads Administration of the Federal Works Agency reported September 10.

The Public Roads Administration said lack of steel for concrete reinforcement, steel bridges and machinery already has caused delays in current work on defense highways being constructed with regular Federal-aid funds. The work includes construction of access roads to camps and defense plants and correction of critical conditions on the strategic network approved by the War Department.

In order to eliminate these delays and to expedite construction the Priorities Division, in a letter to Commissioner Thomas H. MacDonald, indicated the priority preference ratings that will, on request, be assigned when necessary to the various classes of defense-highway work. The preference ratings may be granted for any work of the classes listed without regard to the method of financing. Ratings are to be assigned to specific projects as requests are made by state highway departments and submitted to OPM through the Public Roads Administration. This action covers only Federal-Aid and state highway projects of particular defense importance.

The current program of defense roads financed with Federal aid includes 1,130 miles approved but not under way, 2,142 miles under construction and 1,775 miles planned.

Preference ratings are to be granted as follows:

1. Access Roads:
   a. Access Roads to Military and Naval Establishments.
      Preference Rating of the Access Road Project shall correspond to the rating of the military and naval establishment served; that is, a naval air station or army air base will have a rating of A-1-e, and an army cantonment other than air corps would have a rating of A-1-j.
   b. Access Roads to Defense Manufacturing Establishments.
      Preference rating of the Access Road Project shall correspond to the rating of the defense establishment served, except that the highest rating which can be assigned is A-1-e.
2. Strategic Network of Highways:
   a. All bridges, tunnels, structures and approaches—A-2.
   b. New roads or the improvement of substandard roads and grade-separation structures—A-4.
   c. Shoulder widening and minor drainage structures—A-10.
   d. All other work—B-3.
3. Federal-aid system:
   a. All bridges, tunnels, structures and approaches—A-3.
   b. New roads or improvement of substandard roads, and grade-separation structures—A-7.
   c. Shoulder widening and minor drainage structures—A-10.
   d. All other work—B-3.
4. Federal-aid Secondary and National Park and Forest Projects:
   a. Bridges and approaches—A-7.
   b. New roads or the improvement of substandard roads and grade-separation structures—A-10.
   c. All other work—B-3.
5. Projects for the construction or improvement of the Inter-American Highway—A-3.
6. Construction of the Trans-Isthmian Highway and the Chorrera-Rio Hato Highway in Panama—A-1-b.

Defense Homes.—The president has approved the following defense-home construction projects since the list of July 24:

Permanent (all recommended for construction by Federal Works Agency): *Alabama,* Tuskegee 30; *California,* Camp 30, Long Beach 485; *Illinois,* Rockford 350; *Texas,* Freeport 200; *Virginia,* Newport News 362; *Washington,* Keyport 300.

Temporary (recommended for construction by the Farm Security Administration): *Oregon,* Umatilla 100.

Maintenance and Repair Priorities.—A new plan to grant priority assistance for repair work in the quarrying, mining and other essential industries was announced September 9 by Donald M. Nelson, Director of Priorities, OPM. It represents an effort to keep American defense industries running at full speed, and to prevent any break in the increasing tempo of defense production.

The new plan takes the place of the Maintenance and Repair Order which was announced August 8, but which was never actually issued because of administrative difficulties in handling the paper work it would have involved.

The new plan, which is now available, provides machinery under which priority status for repair work in 20 industrial classifications can be obtained, so that firms and agencies in these classifications may obtain repair parts promptly.

The revised scheme permits qualified producers or suppliers to apply a preference rating of A-10 to deliveries of required repair parts by endorsing a special statement on purchase orders, certifying that the material being ordered is for repair work under the terms of the order, P-22.

The order can be used also to get deliveries for "emergency inventory."

Repairs are defined in the order as repairs needed because of an actual or imminent breakdown. Emergency inventory is defined in the order as the minimum inventory of material required to provide for repairs to meet an actual or imminent breakdown.

The present order is designed primarily to protect industry against sudden breakdowns and is regarded as an interim measure. The entire inventory problem is to be studied further with a view to providing broader priority assistance. It is felt, however, that the present plan will keep the essential industries covered running on their normal basis and will prevent serious interruption to defense production by giving producers a simple method for obtaining vital repair parts.

The order itself, a copy of which follows, should be read carefully by all those who are to operate under its terms. The industries covered are listed specifically, and other classifications may be added from time to time. Special orders may be worked out to meet problems in certain industries.

TITLE 32—NATIONAL DEFENSE
CHAPTER IX—OFFICE OF PRODUCTION MANAGEMENT
Subchapter B—Priorities Division
Part 958—Repairs
Preference Rating Order No. P-22

958.1 Preference Rating Order.—For the Purpose of facilitating the acquisition of material for the repair of the property or equipment of certain industries and services hereinafter specified, a preference rating is hereby assigned to deliveries of material for such purpose upon the following terms:

(a) *Definitions*

(1) "Producer" means any individual, partnership, association, corporation, governmental unit, or other organization engaged in one or more of the following industries and services, and such other industries and services as may be added from time to time by supplement to this order:

(i) The following federal, state, county and municipal services: Fire and police services; highway maintenance.

(ii) Carriers:
   (a) Urban, suburban, interurban, and intercity common, contract, and private carriers of passengers or freight by electric railway, electric coach, motor truck, or bus, including terminals.
   (b) Railroads, including terminals.
   (c) Shipping.—Commercial carriers of freight and passengers by ocean, lake, river, or canal, including terminals.

(iii) Chemicals.—Plants engaged in producing chemicals by chemical processing of raw materials.

(vi) Coke Converting.

(v) Educational Institutions (including vocational training.)

(vi) Explosives.—Plants engaged in manufacturing explosives.

(vii) Farm Machinery and Equipment.—Plants engaged in manufacturing farm machinery and equipment.

(viii) Food Processing or Storing.—Plants engaged in any of the following: milling, refining, preserving, refrigerating, wholesaling or storing of food for human consumption or livestock feed.

(ix) Highway Maintenance and Equipment.—Plants engaged in the production of equipment used in highway maintenance.

(x) Hospitals, Clinics and Sanatoria.

(xi) Lumber.—Plants engaged in the production of lumber (including planing, drying, storing, and treating of lumber), cooperage, plywood, and millwork.

(xii) Metallurgy.—Plants engaged in the production of metals and alloys.

(xiii) Mines and Quarries including ore dressing or processing plants and smelting facilities).

(xiv) Newspapers.—Plants engaged in the publication of newspapers.

(xv) Petroleum Production, Refining and Transportation.—Plants and equipment used in petroleum production, refining and transportation.

(xvi) Radio.—Commercial broadcasting and communication (not including home receiving sets).

(xvii) Research Laboratories (industrial and academic).

(xviii) Rubber and Rubber Products.—Plants engaged in the production of rubber and rubber products including reclaimed and synthetic rubber.

(xix) Shipyards and Ship Repair Yards engaged in building and repairing ships (excluding yards devoted principally to pleasure craft).

(xx) Telephone and Telegraph Communication.

(2) "Material" means any commodity, equipment, accessories, parts, assemblies, or products of any kind.

(3) "Repairs" means only repairs needed because of an actual or imminent breakdown, from whatever cause, of a producer's property or equipment.

(4) "Emergency inventory" means minimum inventory of material required to provide for repairs to meet an actual or imminent breakdown, from whatever cause, of a producer's property or equipment.

(5) "Supplier" means any person with whom a purchase order or contract has been placed by a producer or any supplier for—

(i) Material to be used for repairs.

(ii) Material required for a producer's emergency inventory.

(iii) Material to be physically incorporated in other material which is to be used for repairs or which is required for a producer's emergency inventory.

(b) *Assignment of Preference Rating*

Subject to the terms of this Order, Preference Rating A-10 is hereby assigned.

(1) to deliveries to a producer of material required by him for repairs or for his emergency inventory;

(2) to deliveries to a supplier of material which is, in turn, to be delivered to a producer for repairs or for his emergency inventory or to be physically incorporated in material to be so delivered.

(c) *Persons Entitled to Apply Preference Rating*

The preference rating hereby assigned may be applied by—

(1) a producer;

(2) a supplier, provided that he requires the material so purchased in order to make deliveries duly rated pursuant to paragraph (b).

(d) *Application of Preference Rating*

(1) A producer, in order to apply the preference rating to a delivery of material to him, must endorse the following statement on the original and all copies of the purchase order or contract for such material signed by a responsible official duly designated for such purpose by such producer:

"Purchase Order for Repair or Emergency Inventory-Preference Rating A-10 under Preference Rating Order P-22."

Such endorsement shall constitute a certification to the Office of Production Management that such material is required for the purposes stated therein. Any such purchase order or contract shall be restricted to material the delivery of which is rated in accordance herewith.

(2) A supplier in order to apply the preference rating to a delivery of material to him must endorse the following statement on the original and all copies of the purchase order or contract for such material signed by a responsible official duly designated for such purpose by such supplier:

"Purchase Order for Material required to fill a duly-rated Order for Repair or Emergency Inventory. This purchase order bears Preference Rating A-10 under Preference Rating Order P-22."

Such endorsement shall constitute a certification to the Office of Production Management that such material is required to fill an order placed by a producer or supplier duly rated in accordance herewith. Any such supplier's purchase order or contract shall be restricted to material the delivery of which is rated in accordance herewith.

(3 A producer or supplier placing any such rated purchase orders or contracts and the supplier selling the material covered thereby, must each retain endorsed copies of such purchase orders or contracts segregated from all other purchase orders or contracts for a period of two years from the date thereof for inspection by authorized representatives of the Office of Production Management.

(e) *Restrictions on Application of Rating*

The preference rating hereby assigned shall not be applied—

(1) by a producer to obtain material in excess of his requirements for repairs or for his emergency inventory;

(2) unless the material to be delivered can not be obtained when required without such rating;

(3) by a supplier to obtain material in excess of the amount necessary to make rated deliveries.

(f) *False Statements and Penalties*

Any person who applies the preference rating hereby assigned in wilful violation of the terms and provisions of this order, or wilfully falsifies records required to be kept or information to be furnished pursuant to this order, or who obtains a delivery of material by means of a material and wilful misstatement will be prohibited from further applying said rating. Such person may also be prohibited from obtaining further deliveries of material under allocation and be deprived of any other priorities assistance. The Director of Priorities may also take any other action deemed appropriate, including the making of a recommendation for prosecution under Section 35A of the Criminal Code (18 U.S.C. 80).

(g) *Revocation or Modification*

This order may be revoked or amended by the Director of Priorities at any time in whole or in part or in its application to any producer or any supplier. In the event of revocation, or upon expiration of this order, deliveries already rated pursuant to the order shall be completed in accordance with said rating, unless the rating has been specifically revoked. No additional applications of this rating to any other deliveries shall thereafter be made by any producer or supplier affected by said revocation or expiration.

(h) *Effective Date*

This order shall take effect on the 9th day of September, 1941, and unless sooner revoked shall expire on the 28th day of February, 1942.

An interpretation of the repair plan in the case of an organization which has two or more plants, not all of which fall within the classification of essential industries which may use the repair plan, the interpretation says, the special preference rating may be used to get repair materials only in those plants which fall within the classifications set forth in the original order.

New OPM Divisions.—The Office of Production Management since August 29 has been through six divisions:

Civilian Allocations—Leon Henderson, director.

Labor Division—Sidney Hillman, director.

Materials Division—William L. Batt, director.

Priorities Division—Donald M. Nelson, director.

Production Division—W. H. Harrison, director.

Purchase Division—Douglas L. MacKeachie, director.

Plant-Expansion Certificates.—The NDAC issued the following Certificates of Necessity for plant expansion to producers of non-metallic minerals between August 1 and 15:

Eureka Fire Brick Works, Pittsburgh, Pa.—Firebricks, $87,000.

Priorities Critical List.—The OPM Priorities Division's Critical List of July 14 (*P & Q*, August 1941, page 27) was revised August 11 and the following items have been added or altered as shown by italic type:

Asbestos products, to include only roofing, siding, pipe and pipe covering.

Engines: Steam, *all types.*

Motors: Electric, *including fractional horsepower.*

Motor Trucks: Industrial (*electric, gas-electric and gasoline-powered*).

Quarrying equipment, including only rock crushers, rock drills, and conveyors.

Shovels, power.

Priority-Order Regulations.—A series of broad rules and regulations which will apply to priorities orders and actions was issued August 28 in a new basic document—Priorities Regulation No. 1—by E. R. Stettinius, Jr., Director of the Priorities Division, OPM. The most important provision of the regulation is that which requires all manufacturers and producers to accept defense orders (subject to a few specific limitations) even if acceptance of these orders will prevent, or delay, deliveries on non-defense orders or defense orders with lower preference ratings.

Defense orders are defined and a re-

quirement that defense orders be accepted is set forth in a 6-point formula. This formula is similar to that which appeared for the first time in the pig-iron priority order, but it is now provided that the requirement applies to all manufacturers, producers, distributors and dealers, in whatever category.

Since the new regulation lays down a general framework for priorities compliance, future orders issued by the division will merely cite Regulation No. 1 and will not repeat the full text of the requirements.

However, the specific provisions of any existing or future order issued by the Director of Priorities will control when in conflict with the general provisions of Regulation No. 1. In the absence of such a conflict, Regulation No. 1 will always be applicable to any priorities order.

The following is an informal summary of major provisions of the new regulation:

(1) The regulation provides a system under which any defense customer for any material, who is unable to place his order satisfactorily, or whose delivery is delayed, may bring this matter formally before the Director of Priorities who will take appropriate action.

(2) The director may assign preference ratings to orders which have been placed or which have not been placed, and he may also issue binding instructions regarding deliveries, without assigning preference ratings.

(3) Any person who has defense orders on hand must so schedule his production that deliveries under defense orders will be made on the dates required.

(4) Delivery dates specified in defense orders must not be earlier than required.

(5) Any allocations of material ordered by the director may be made without regard to preference ratings which may have been assigned to deliveries under particular contracts or purchases, and in such cases specific allocations will take precedence over individual preference rating certificates or blanket ratings.

(6) Intra-company deliveries, except when otherwise specified, are to be subject to the same restrictions which may apply to inter-company deliveries.

(7) Accumulation of excess inventories is prohibited.

(8) All records required to be kept by priority orders are to be open to audit and inspection by representatives of the OPM.

(9) Any person making wilful false statements may be deprived of deliveries of material; in cases where such action is warranted, the Director may also recommend prosecution under section 35 of the Criminal Code (18U.S.C. 80).

A slightly-abbreviated copy of Priorities Regulation No. 1 follows:

TITLE 32—NATIONAL DEFENSE

CHAPTER IX—OFFICE OF PRODUCTION MANAGEMENT

Subchapter B—Priorities Division

Part 944—Priorities Division Regulations

Priorities Regulation No. 1

Establishing provisions and definitions applicable to the operation of the priorities system.

The following regulation is issued by the Director of Priorities to promote the defense of the United States and for the purpose of improving and facilitating the operation of the Priorities System.

944.1 *Definitions*

(a) "Person" means any individual, partnership, association, corporation or other form of enterprise.

(b) "Defense Order" means:

(1) Any contract or order for material or equipment to be delivered to, or for the account of:

(i) The Army or Navy of the United States, the United States Maritime Commission, the Panama Canal, the Coast and Geodetic Survery, the Coast Guard, the Civil Aeronautics Authority, the National Advisory Commission for Aeronautics, the Office of Scientific Research and Development;

(ii) The government of any of the following countries: The United Kingdom, Canada and other Dominions, Crown Colonies and Protectorates of the British Empire, Belgium, China, Greece, The Kingdom of the Netherlands, Norway, Poland, Russia and Yugo-slavia.

(2) Any contract or order placed by any agency of the United States Government for material or equipment to be delivered to, or for the account of, the government of any country listed above, or any other country, including those in the Western Hemisphere, pursuant to the Act of March 11, 1941, entitled "An Act to Promote the Defense of the United States," (Lend-Lease Act).

(3) Any other contract or order to which the Director of Priorities assigns a preference rating of A-10 or higher.

(4) Any contract or order for material or equipment required by the person placing the same to fulfill his contracts or orders on hand, provided such material or equipment is to be physically incorporated in material or equipment to be delivered under contracts or orders included under (1), (2) or (3) above.

(c) "Material" means any commodity, equipment, accessories, parts, assemblies or products of any kind.*

944.2 *Acceptance of Defense Orders*

Defense orders for any material, whether or not accompanied by a Preference Rating Certificate, must be accepted and fulfilled in preference to any other contracts or purchase orders for such material, subject to the following provisions:

(a) Defense orders must be accepted even if acceptance will render impossible, or result in deferment of—

(1) deliveries under non-defense orders previously accepted, or

(2) deliveries under defense orders previously accepted bearing lower preference ratings, unless rejection is specifically permitted by the Director of Priorities;

(b) Defense orders need not be accepted—

(1) if delivery on schedule thereunder would be impossible by reason of the requirements of defense orders previously accepted bearing higher or equal preference ratings, unless acceptance is specifically directed by the Director of Priorities;

(2) if the person seeking to place the defense order is unwilling or unable to meet regularly established prices and terms of sale or payment, but there shall be no discrimination against defense orders in establishing such prices or terms;

(3) if the material ordered is not of the kind usually produced or capable of being produced by the person to whom the defense order is offered;

(4) if such defense orders specify deliveries within fifteen days, and if compliance with such delivery dates would require the termination before completion of a specific production schedule already commenced.*

944.3 *Rejected Orders*

When a defense order for any material has been rejected in violation of this regulation, the person seeking to place such order may file with the Division of Priorities a verified report in form to be prescribed, setting forth the facts in connection with the alleged rejection. When the facts set forth justify such action, the Director of Priorities will thereupon direct the person against whom complaint is made to submit a sworn statement setting forth the circumstances concerning the alleged rejection. Thereafter, such action will be taken by the Director of Priorities as he deems appropriate.*

944.4 *Assignment of Preference Ratings*

Preference ratings may be assigned to contracts, purchase orders or deliveries by means of Preference Rating Certificates issued by authority of the Director of Priorities, or by regulations of orders issued by the Director of Priorities assigning ratings to particular deliveries or to specified classes of deliveries. Such ratings may be assigned to deliveries under accepted contracts or purchase orders, and also, in the case of defense orders, to purchase orders which have not been placed or accepted at the time the rating is applied for. The Director of Priorities may also issue specific directions as to particular deliveries, without assigning ratings thereto.*

944.5 *Sequence of Preference Ratings*

Preference Ratings, in order of precedence, are: AA, A-1-a, A-1-b, etc., . . . A-1-j; A-2, A-3, etc., . . . A-10; BB, B-1, B-2, etc., . . . B-8, AA being the highest rating presently assigned.*

944.6 *Doubtful Cases*

Whenever there is doubt as to the preference rating applicable to any delivery, or as to whether a particular order is a defense order, the matter is to be referred to the Division of Priorities for determination, with a statement of all pertinent facts.*

944.7 *Sequence of Deliveries.*

(a) Every delivery under a defense order shall be made in preference to deliveries under all other contracts or orders whenever, and to the extent, necessary to fulfill the delivery schedule provided in the Preference Rating Certificate covering such delivery, or in the contract or purchase order if no certificate has

* Sections 944.1 to 944.21, inclusive, issued pursuant to the authority contained in O.P.M. Regulation 3, March 7, 1941, 6 F.R. 1596; E.O. 8629, January 7, 1941, 6 F.R. 191; sec. 2(a), Public No. 671, 76th Congress, Third Session, as amended by Public No. 89, 77th Congress, First Session; sec. 9, Public No. 783, 76th Congress, Third Session.

been issued. Deliveries bearing no preference rating or lower preference ratings shall be deferred to the extent necessary to assure those deliveries bearing higher preference ratings, even though such deferment may cause defaults under other contracts or purchase orders. Each person who has defense orders on hand must so schedule his production and deliveries that deliveries under defense orders will be made on the dates required, giving precedence, in case of unavoidable delay, to deliveries bearing the higher preference ratings.

(b) The sequence of deliveries bearing the same preference rating shall be determined by the delivery dates specified in their respective Preference Rating Certificates, or if the ratings were assigned by order or direction of the Director of Priorities, but no certificates were issued, then by the dates specified in the contracts or purchase order. In any case where both preference ratings and delivery dates are the same, and it is impossible to make all deliveries on schedule, the matter is to be referred to the Division of Priorities for instructions as to sequence.*

944.8 *Delivery Schedules*

No earlier delivery date shall be specified in any defense order than required by the production or delivery schedules of the person placing the defense order. No preference rating will be assigned to any contract or purchase order specifying delivery dates earlier than required by the production or delivery schedules of the person placing the contract or purchase order.*

944.9 *Deferred Deliveries.*

When deliveries under defense orders have been unreasonably or improperly deferred, the person entitled to delivery may file with the Division of Priorities a verified report in form to be prescribed, setting forth the facts in connection with the alleged deferment. When the facts set forth justify such action, the Director of Priorities will thereupon direct the person against whom complaint is made to submit a sworn statement, setting forth the circumstances concerning the alleged deferment of deliveries. Thereafter, such action will be taken by the Director of Priorities as he deems appropriate.*

944.10 *Allocations*

When specific allocations of a material are made by the Director of Priorities, such allocations may, in the discretion of the director, be made without regard to any preference ratings which have been assigned to deliveries under particular contracts or purchase orders.*

944.11 *Use of Material Obtained under Allocation or Preference Rating*

Any person who obtains a delivery of any material under an order or specific direction of the Director of Priorities, or a delivery of material bearing a preference rating, must use such material, or an equivalent amount thereof, for the purpose specified in connection with the issuance of the order, direction or rating.*

944.12 *Intra-Company Deliveries*

When any order of the Director of Priorities prohibits or restricts deliveries of any material by any person, such prohibition or restriction shall, in the absence of a contrary direction, apply not only to deliveries to other persons, including affiliates and subsidiaries, but also to deliveries from one branch, division or section of a single enterprise to another branch, division or section of the same or any other enterprise owned or controlled by the same person.*

944.13 *Effect of Order: Damages*

When any order of the Director of Priorities prohibits or restricts deliveries of any material, such prohibition or restriction shall, in the absence of a contrary direction, apply to all deliveries made after the effective date of the order, including deliveries under contracts or purchase orders accepted either prior or subsequent to the effective date of the order. No person shall be held liable for damages or penalties for any default under any contract or purchase order which shall result directly or indirectly from his compliance with any rule, regulation or order issued by the Director of Priorities.*

944.14 *Inventory Restriction.*

Unless specifically authorized by the Director of Priorities, no person shall, after the effective date of this regulation, knowingly make delivery of any material whatever, and no person shall accept delivery thereof, in an amount, quantity or number which will increase for any current month the inventory of such material of the person accepting delivery, in the same or other forms, in excess of the amount, quantity or number necessary to meet required deliveries of the products of the person accepting delivery, on the basis of his current method and rate of operation. This provision shall not prohibit or restrict:

(a) Deliveries for direct export out of the United States, provided that such exports shall have been licensed by theAdministrator of Export Control;

(b) deliveries of imported material to any person importing the same, either directly or through an agent.*

944.15 *Records*

All persons affected by any order of the Director of Priorities shall keep and preserve for a period of not less than two years accurate and complete records of their inventories of the material covered by such order and of the details of all transactions in the material covered by such order. Such records shall include the dates of all contracts or purchase orders accepted, the delivery dates specified in such contracts or purchase orders, and in any Preference Rating Certificates accompanying them, the dates of actual deliveries thereunder, description of the material covered by such contracts or purchase orders, description of deliveries by classes, types, quantities, weights and values, the parties involved in each transaction, the preference ratings, if any, assigned to deliveries under such contracts or purchase orders, details of all defense orders either accepted or offered and rejected, and other pertinent information.*

944.16 *Audit and Inspection*

All records required to be kept by this Regulation or by any order of the Director of Priorities shall, upon request, be submitted to audit and inspection by duly authorized representatives of the Office of Production Management.*

944.17 *Reports*

All persons affected by any order of the Director of Priorities shall execute and file with the Office of Production Management such reports and questionnaires as said office shall from time to time request. No reports or questionnaires are to be filed by any person until forms therefor are prescribed by the Office of Production Management.*

944.18 *False Statements*

Any person who wilfully falsifies any records which he is required to keep by the Director of Priorities, or who otherwise wilfully furnishes false information to the Director of Priorities or to the Office of Production Management, and any person who obtains a delivery, an allocation of material or a preference rating by means of a material and wilful misstatement may be prohibited by the Director of Priorities from making or obtaining further deliveries of material under allocation and may be deprived of further priorities assistance. The Director of Priorities may also take any other action deemed appropriate, including the making of a recommendation for prosecution under section 35A of the Criminal Code (18 U.S.C. 80.)*

944.19 *Appeal*

Any person affected by any regulation or order of the Director of Priorities who considers that compliance therewith would work an exceptional and unreasonable hardship upon him, may appeal to the Division of Priorities by addressing a letter to the Division of Priorities, Office of Production Management, Social Security Building, Washington, D. C., setting forth the pertinent facts and the reasons such person considers that he is entitled to relief. The Director of Priorities may thereupon take such action as he deems appropriate.*

944.20 *Notification of Customers*

Any person who is prohibited from, or restricted in, making deliveries of any material by the provisions of any order of the Director of Priorities shall, as soon as practicable, notify each of his regular customers of the requirements of such order, but the failure to give such notice shall not excuse any customer from the obligation of complying with the terms of such order.*

United States Gypsum Strikes.—The August 29 recommendations of the National Defense Mediation Board asking 3,000 employees on strike in 17 plants of the United States Gypsum Company to return to work in the interest of national defense was accepted immediately by the workers, members of the Gas, By-Products, Coke and Chemical Workers, CIO.

The strike, which had been in effect since June 26, tied up 40 per cent. of the total national production of gypsum, plaster and wallboard necessary to the defense housing program and other building construction.

The board on August 19 issued an interim recommendation covering the first of five issues in controversy. It denied a union request for a master agreement covering the 17 plants on strike and recommended that the company and the union send representatives to Washington for direct negotiations under auspices of the board. The union accepted the recommendation of the board that it waive for the present its demand for a master contract. The recommendation that the company commence negotiations for separate plant contracts under the auspices of the Board was refused by the company.

Owen D. Young, the special investigator, appointed by the board, is directed to complete the investigation and report to the board within 30 days after which the board will proceed to make its finding of fact and recommendations. Hearings were begun at his office in New York City on September 9.

The 17 plants of the U. S. Gypsum Company involved in the dispute are at Jersey City and Harrison, New Jersey; Staten Island, New York City and Oakfield (factory and mine, New York; Philadelphia, Pennsylvania; Boston and Farnams, Massachusetts; East Chicago and South Bend, Indiana; River Rouge and Alabaster, Michigan; Fort Dodge, Iowa; Falls Village, Connecticut; Genoa, Ohio; and South Gate, California.

EDITORIAL

Defense for War—IX

EVERY time a plane falls, every time a dock burns, every time the workers in a defense plant strike, every time there occurs an accident that might conceivably be due to *sabotage* there is general suspicion that the cause may, or indeed will, be found in the workings of the "fifth column." There is now, as there was in World War I, an unreasonable readiness to ascribe to the activities of the "enemy within" events whose causes may be wholly unrelated to the efforts of those who would hamper the defense program of America. Fortunately we have not yet reached that point where the average citizen sees a German spy around every corner, where the casual and harmless utterances of truly patriotic men and women are unintentionally or deliberately garbled and distorted into expressions of doubtful meaning, where everyone tries to read into the conversations of ordinary people the malicious intent and prying curiosity of the spy and *saboteur*. As a nation we still seem to be preserving an attitude of cautious skepticism.

It may be doubted, however, whether most of us are sufficiently alert to the methods of the intellectual *saboteur,* the person whose subtle insinuations, seemingly innocent remarks, and friendly gossip are calculated to, and actually do, undermine our faith in the principles on which American government has been founded. It may be doubted, too, whether most of us are aware of the many ways in which each one of us at some time may unconsciously act as the distributor of misstatements and half-truths, which, clothed in innocent garb, slip by our guard of natural skepticism. No one seems to be sufficiently astute in all cases to strip off this cloak of plausibility and expose the kernel of falsity underneath; no one is always sufficiently the master of his emotions to separate the portions which appeal to his pride, loyalty and sympathy from those which lead him to erroneous conclusions; no one is always on guard.

The readiness with which many people unquestionably accept what they are told, what they read in their newspapers, to say nothing of what they see, is still a cause for marvel. In a country where so much time and money have been devoted to public formal education; where so many organs of opinion (some of them misnamed newspapers) work unremittingly in the interest of "freedom of speech" and "freedom of the press" (of a kind); where a system of broadcasting, that could be as inspiring and informative as it often is inciting and misleading, claims an ever-growing share of the public's leisure time; in that country there are still great masses of people whose gullibility, tolerance and good-will toward others make them the easy prey of special pleaders. We have yet to discover the method of teaching that will give Americans the ability to separate the true from the false, to recognize propaganda as what it really is, to see in the presumably innocent remarks of some people the artfully-disguised misrepresentations that may so easily mislead them.

Many people find it difficult to believe that propaganda of this sort is being widely circulated or that it is skilfully enough concealed to escape detection. They are too proud to admit that they might be "taken in," that they might fail to test and analyze it before accepting it, that they are not shrewd enough to penetrate the carefully-perfected disguises that cover it. Yet one needs but a moment or two of conversation with such persons to discover that they are among the ones most easily victimized, that what they would call their keen powers of discernment are but the wall of stubborn opinion erected by the propaganda to which they have been exposed. It is amusing to see how rapidly and through what distortions and magnifications a casual remark will pass in being handed about in a roomful of people of average intelligence. The most astounding lies will scarcely be challenged; the silliest statements presented in pseudo-scientific jargon will win immediate acceptance; alleged secret habits of weaknesses of prominent persons will never be questioned however unfair; persons of unimpeachable integrity can be ostracized by accusing them of unorthodox political, economic or social beliefs.

A technique that works so effectively in the hands—more literally, the mouth—of the private gossip with "inside information" or "a friend in Washington" is made many times more powerful when dignified by delivery from a public platform. The audience is much larger and the power of oratory augments that of the whispered rumor; but more important than these is the added prestige given to statements that are made openly and may, for that reason, presumably be challenged. Assertions to which no such objection is raised acquire all the force of claims factually demonstrated or charges legally proved. If the speaker is a person of national prominence; if he occupies a position which is assumed to give him access to information not generally available; if he has accomplished some feat of daring that seems to indicate the possession of uncommon courage; if he has ever been a public hero—if he falls in any of these classes he is certain to be listened to with uncommon attention and respect and what he says is certain to be accepted with less than the usual amount of caution.

MANY men who have no stronger claims to serious regard are passing these days across the American stage. They presume to speak for the nation; they clothe their utterances in high-sounding phrases calculated to wring the hearts of freedom-loving Americans. Yet, although born in a civilization based on the principles of freedom and equality, they seem to have absorbed little of the ennoblement which such ideals should produce in men. Lindbergh's recent speech in Des Moines provided a painful example of appealing to group prejudices in an effort to sway an audience in the direction of the speaker's objectives. One who can so lightly pervert the privilege of free speech can make no just claim to sincerity in the cause of American principles.

This is the kind of thing for which people who value the right of individual thinking must be ever on guard. It is the kind of thing which encourages those who sneer at democracy, who allege the inability of the average man to govern himself, who strive for the attainment of a one-man-dominated "new world order."

CURRENT BUSINESS INDICATORS

The past month has been featured by a series of developments in Washington that promise to be of far-reaching significance to all segments of business and industry. In effect, the country has been put on a full war economy by what has taken place in recent weeks. All-out defense is no longer an empty catch phrase, but a reality with grim and bewildering implications.

To industry the most important single development of the past month was the wholesale reorganization of the defense agencies and the creation of the Supply Priorities and Allocations Board. The duties of this new agency, the SPAB as it was promptly dubbed, will be to determine requirements, establish priorities, and allocate supplies of materials. In addition to determining requirements—including military, lease-lend, and civilian—the new agency is vested with the authority for fulfilling them.

Despite the widespread belief that SPAB was simply another paper organization with power to recommend, rather than to act, events of the past three weeks indicate that the establishment of the new agency marks a decisive turning point in our defense effort. In the three weeks that have elapsed since the board was created, there has been persuasive evidence that SPAB not only has real authority, but what is more to the point, is quite amenable to assuming this authority. Accordingly the pace of the defense agencies has changed from a leisurely dogtrot to a gallop. Moreover, as long as Donald Nelson remains as the operating head the drive and vitality of SPAB is almost certain to continue unabated.

Only slightly less important than the creation of the new super-defense agency, was the reorganization of the OPM's Defense Contract Service. On September 4, the President ordered the establishment, within the Office of Production Management, of a Division of Contract Distribution. Headed by Floyd B. Odlum, the new division will be responsible for widening the geographical and corporate distribution of defense orders.

Another development of outstanding importance has been the new and streamlined plan to grant priority assistance for repair work. The new plan, which became effective on September 9, provides machinery under which priority status for repair work in twenty industrial classifications can be obtained. Among the industrial classifications covered are mines and quarries, highway maintenance and equipment, shipyards, telephone and telegraph communications, and all Federal, State, County, and municipal services. Other classifications may be added from time to time, and special orders may be developed to meet problems of certain industries. The plan is especially important because it represents an effort to keep American defense industries operating at top speed, and to prevent any break in the increasing tempo of defense production.

Meanwhile, expenditures by the Federal Government for national defense in August rose to $1,172,000,000. This is an increase of 9.5 percent over July and represents a new high for monthly defense expenditures. The August increment brings the total expenditures since July 1, 1940, when accelerated spending for defense began, to $9,282,000,000.

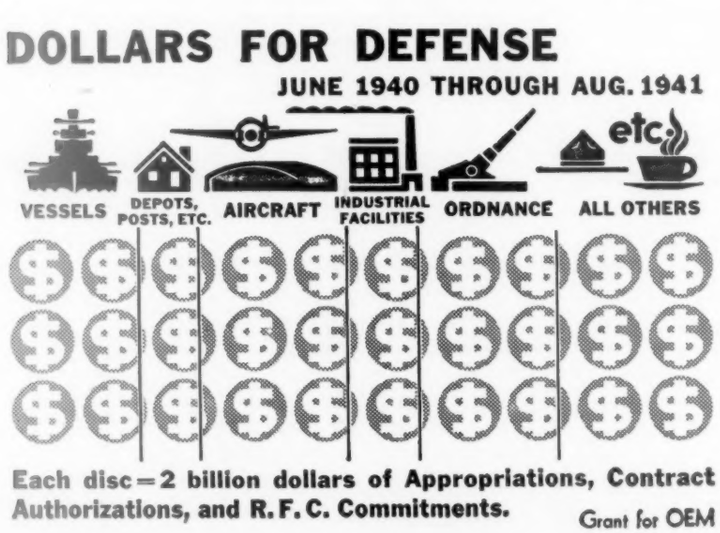
Industrial activity likewise advanced in August, but the gains were much less pronounced than those realized during the other recent months. Against a revised index of 160 for July, the Federal Reserve Board's adjusted index of production in manufacturing and mining advanced to 161 percent of the 1935-39 average in August. This represents a gain of approximately 40 percent since the beginning of the defense program in May 1940.

In August there were further substantial advances in activity in the machinery, aircraft, shipbuilding, and railroad equipment industries. After allowing for seasonal influences small increases were likewise reported in coal, lumber, and petroleum production. Moreover, there was a sharp increase in construction contracts that brought the total volume of awards to a level that is four-fifths above that in the corresponding month of last year. The increase in construction activity in August was again largely accounted for by publicly financed projects.

Partly offsetting these gains was the abrupt decline in automobile production in preparation for the new model year. Small decreases were also reported for cotton-mill activity and furniture production. Output of steel and nonferrous metals evidenced no significant change, with operations maintained at near-capacity levels.

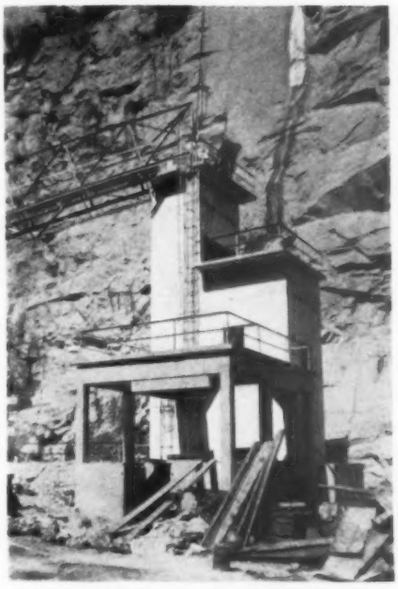
Wholesale prices, as indicated by the Bureau of Labor Statistics index, continued to advance during August and the first half of September. Particularly steep increases were reported in the prices of building materials, grains, foodstuffs, cotton, and a wide variety of industrial commodities that have not yet been restricted by price ceilings. Metal prices, on the other hand, remained almost stationary during the month. Retail prices likewise rose further.

Meanwhile, although hearings before the House Banking and Currency Committee have started, the price-control bill that was presented to Congress the latter part of July remains a long way from the statute books. At the same time it is becoming increasingly evident that the passage of a price-control bill is urgently necessary. The principal question now seems to be whether the legislation should be on a piecemeal basis as the Administration's pending bill provides, or whether the measure should be equally applicable to wages, rents, and commodity prices.

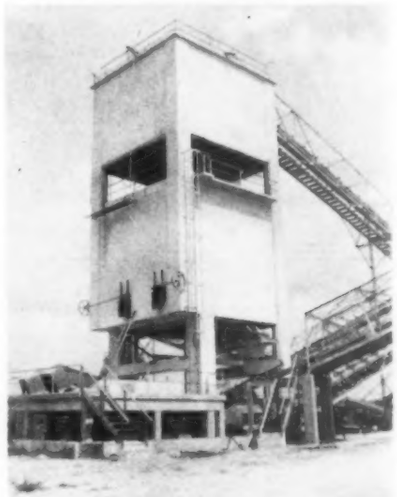


Designer of Outstanding New Crushed-Stone Plant Tells How It Was Done

Jaw-crusher pit in quarry.



Secondary-crusher Building No. 2.



Scalping house showing chute openings for feed to cone crushers and feeder discharge to screen-house conveyor.

IN July 1941 George D. Lott, president of the Palmetto Quarries Company, Columbia, South Carolina, decided he wanted to build a new plant to replace his present crushed-stone plant. He became interested in the manufacture of crushed stone in Columbia in 1914 and operated a plant on the same property from 1914 to 1923 under a partnership agreement, at which time the Palmetto Quarries Company was incorporated. In 1927 Mr. Lott purchased all outstanding interests and became the sole owner of the company. The original plant was rebuilt in 1931, at which time the 20-inch primary crusher was made a secondary crusher and a new 48- by 60-inch jaw crusher installed as a primary. At the same time a 50 B Bucyrus-Erie electric shovel was installed to replace the hand loading of quarry cars. The capacity has varied with the market demands, but in recent years an average production of slightly over 200,000 tons per year has been maintained.

The quarry property was limited and the available supply was about to be exhausted in a short time, unless the operations were carried down to another level. During the years in which Mr. Lott had operated the limited area of the quarry it had been carried down from the level of the surrounding ground area to a depth of nearly 200 feet. The rock is hard granite, and not only tough, but exceptionally abrasive. It has an average overburden of about 27 feet of earth and clay, and in places has an additional overburden of 10 to 15 feet of disintegrated stone directly over the hard granite.

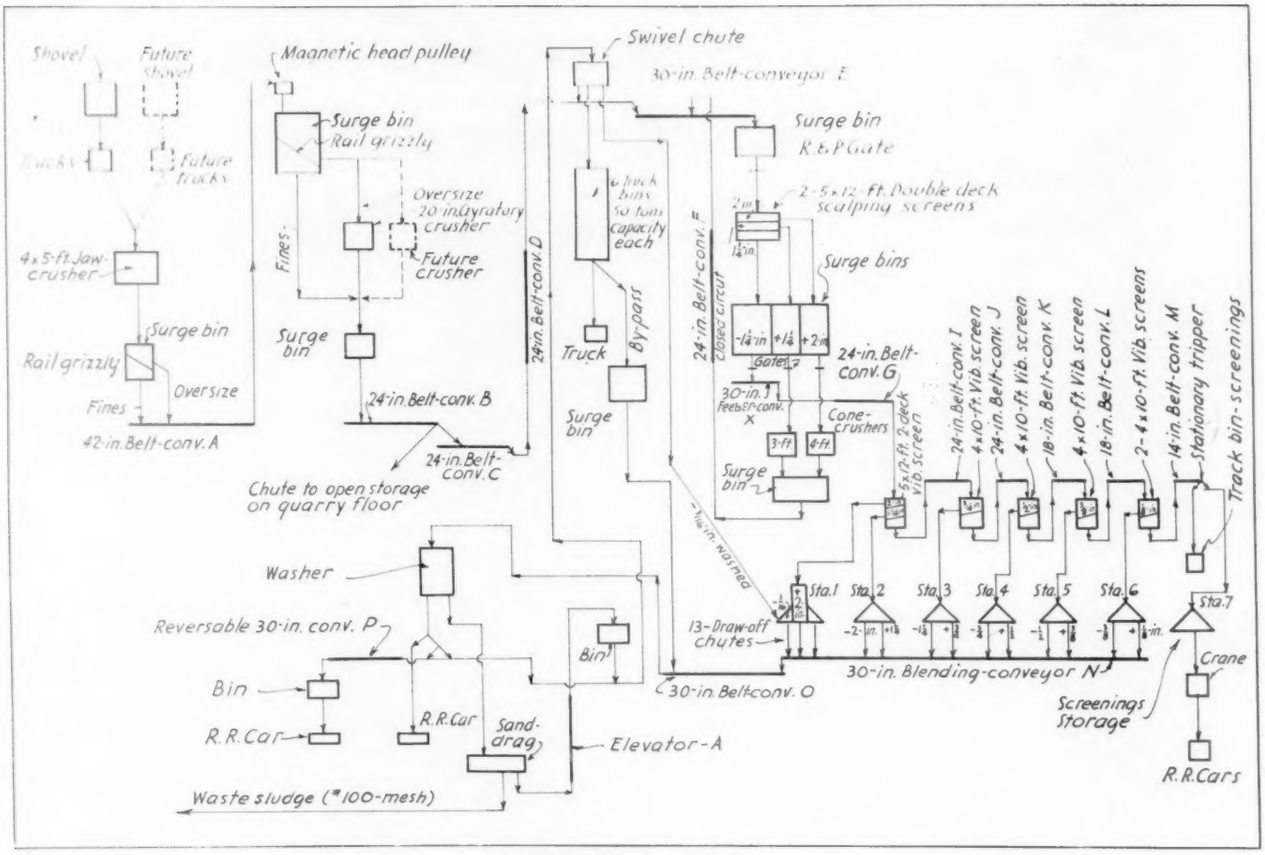
In the spring of 1940 Mr. Lott purchased the land adjoining the quarry property, which until then had not been for sale. He then decided to replace the old plant with a new and modern one, utilizing such machinery from the old plant as was not obsolete. In the old plant a 15-ton cableway and a 10-ton guy derrick are used to hoist steel skips loaded with 4½ tons of stone from the quarry floor up 200 feet to the plant, which is located at the surface level, where the stone is dumped into the 48- by 60-inch Allis Chalmers jaw crusher. Elevating the stone this distance is expensive and of limited capacity. It takes 950 feet of ¾-inch cable to make a 3-part line for the derrick, which has a 15-inch drum and 14-inch sheaves. This cable has to be replaced in less than 3,300 trips, or about every six weeks. The cableway requires 3,200 feet of ¾-inch cable to make a 4-part line over a 50-inch drum and 21-inch sheaves, and this has to be replaced every five months, after about 11,750 trips.

A skip hoist was considered and investigated before the decision was finally made to use belt-conveyors from the quarry up to the new plant, which is located on the surface level of the ground to the south of the quarry pit.

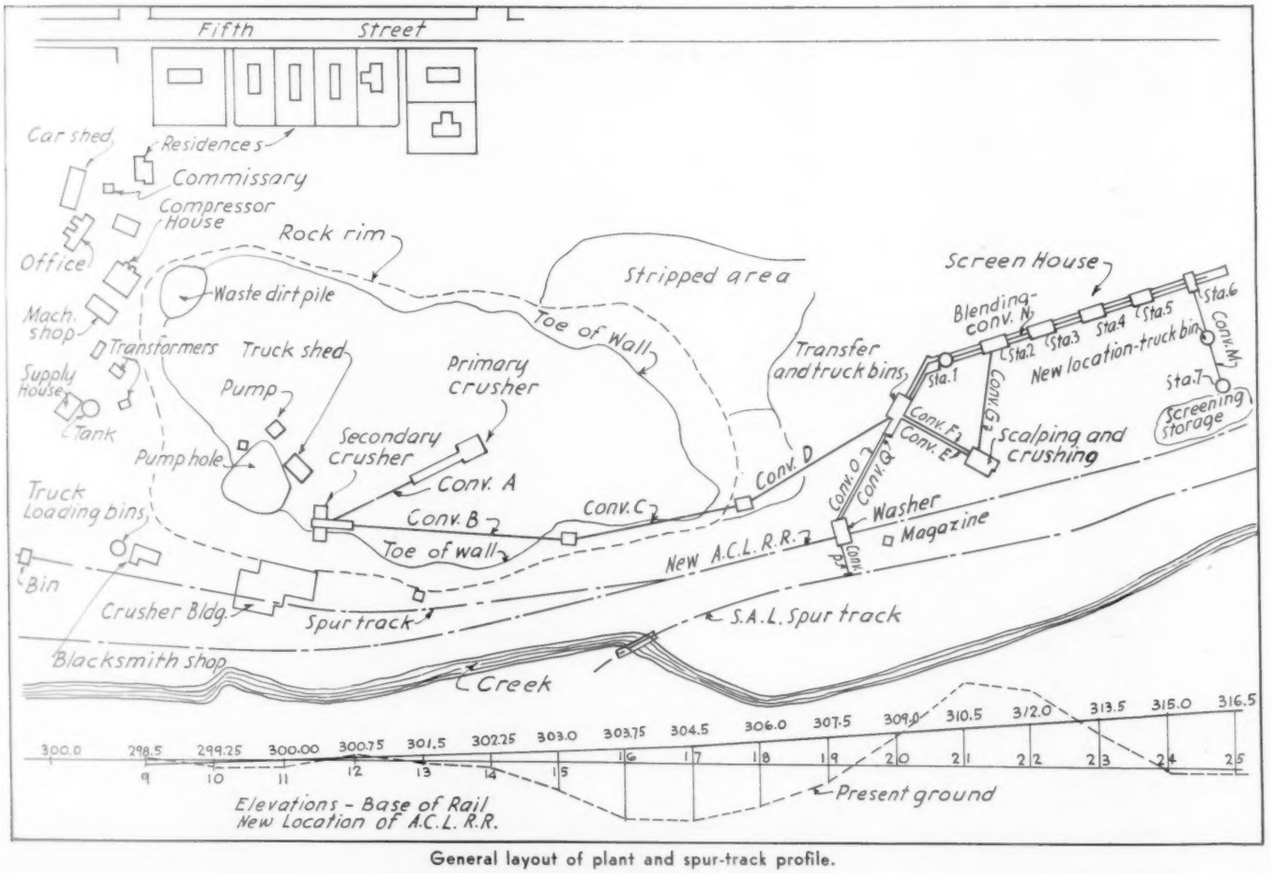
In the general lay-out of the new plant the primary and secondary crushers are located on the quarry floor, and conveyors run up the west wall of the quarry from the quarry level (elevation 96.0) to the plant at the south, located with grade at elevation 320.00.

The capacity of the old plant was 130 tons per hour and it was decided to design the new plant for an average capacity of 175 tons per hour. This average capacity meant that many conveyors would have to carry up to 200 tons per hour at times. The lengths of the conveyors bringing the stone from the quarry to the surface was governed by possible future requirements. The writer laid out the plant on a basis of doubling the capacity at some future time at a present minimum investment for future expansion. While we could not use conveyors narrower than 24-inch for elevating from the quarry to the new plant, due to the size of the material, we could limit the length of these belts so that in the future, when the capacity may be doubled, the idlers can be used and only the belts would need to be replaced with heavier ones and the horsepower of the drive units increased. The length of the belts was decided on the basis of economical belt stresses for double the tonnage in the future, and the present belts are designed on this same belt stress, thus reducing the number of plies required to that which is necessary for the pres-

By E. LEE HEIDENREICH, JR., Consulting Engineer



Working flow sheet of plant.



General layout of plant and spur-track profile.

ent capacity. As there are over 6,300 lineal feet of conveyor belt required for the new plant lay-out, the belt specifications were of great importance as related to the cost of the new plant. The Boston Woven Hose & Rubber Company was awarded the contract for furnishing all the belting for the entire plant.

Washer and car-loading facilities prior to laying new track at Building No. 6.

All the foundations were constructed of reinforced concrete and those conveyors which are below grade were placed in tunnels, these same tunnel walls being utilized as foundation walls for the structures erected over them. From past experiences the writer knew that slip-form concrete construction was readily adaptable for all structures throughout the plant. Comparative estimates were made against structural steel buildings and the reinforced-concrete construction costs were lower by 5 per cent. Therefore this type of construction was used, concrete construction being much more permanent, and yet more flexible for the purposes desired both for the present and for the future. Of the total concrete yardage, 60 per cent. was used in the foundations and 40 per cent. in the superstructures. The Rust Engineering Company was awarded the contract for all the concrete in place. Work commenced January 20, 1941 and was completed August 6.

The new plant as seen from the office showing conveyor from the quarry.

The old plant.

General view of Buildings 3, 4 and 5 as seen from the railroad.

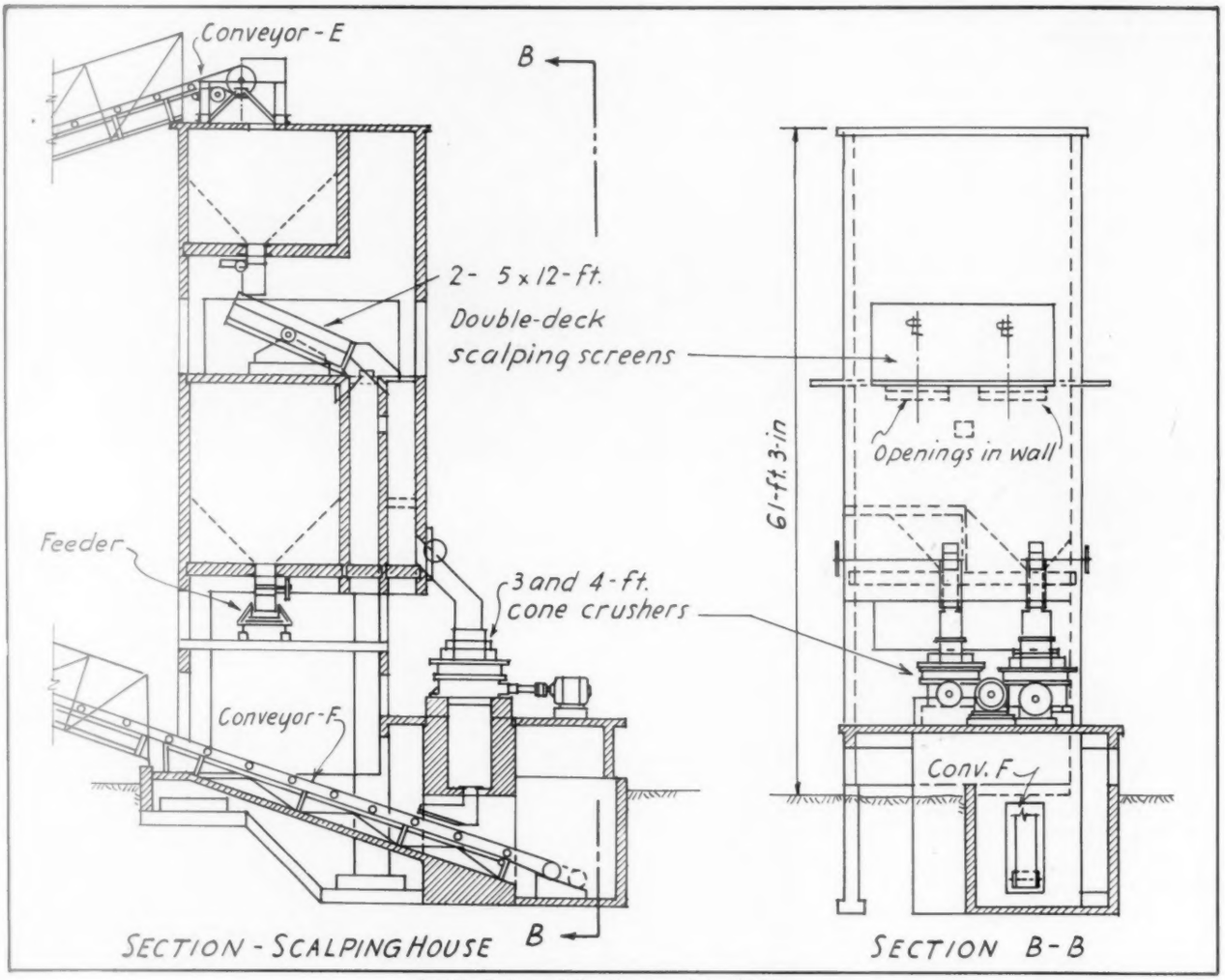
The concrete structures are built in several different shaped buildings.

Building No. 2 has surge bins of concrete.

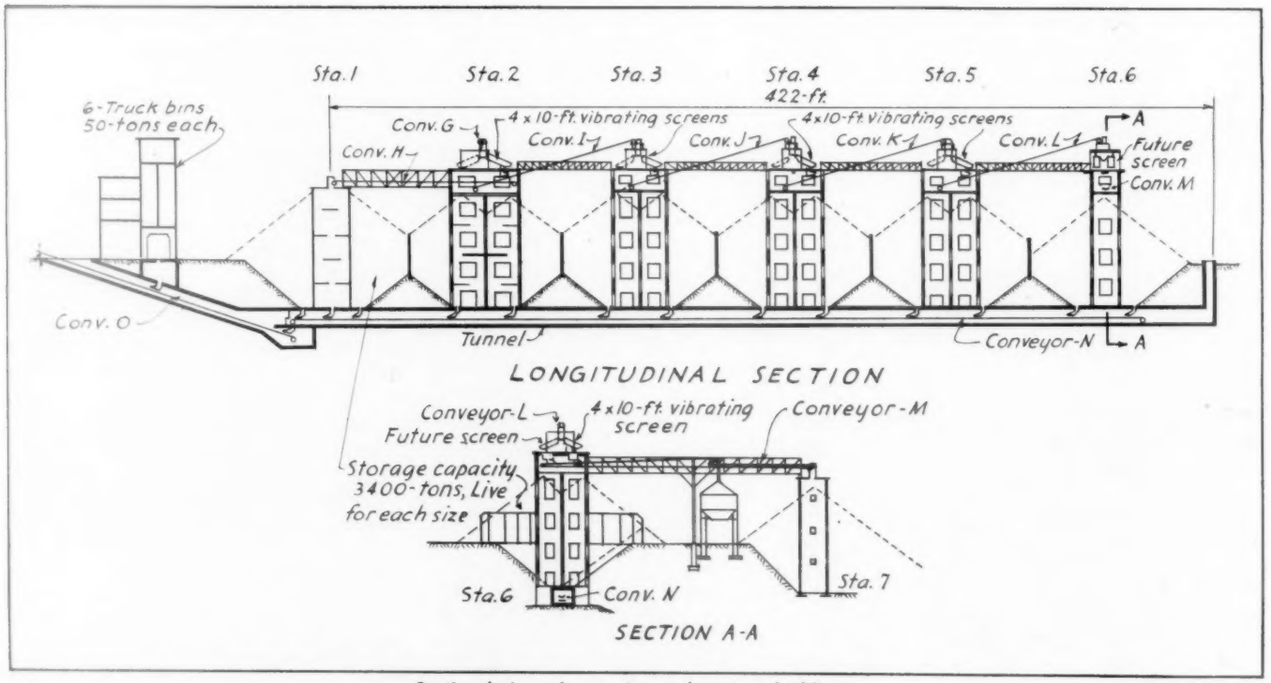
In building No. 3 the scalping house has concrete surge bins above and below the scalping screen and bins to feed the cone crushers.

Building No. 4 uses the skeleton type of construction for the screen supports. The finished product at each of the stations runs out of the large openings resembling windows and when reclaimed, runs back through these same openings. The final design used on the screen-house proved to be lower in cost than partition walls supporting structural-steel trusses which would carry the vibrating screen loads at the middle of a 74-foot span.

Building No. 5 has 6 bins, each of



Sectional views of the No. 3 scalping building.



Sectional view of screening and storage buildings.

50-ton capacity, in addition to various floor levels for conveyors coming in at various angles, and chutes for transfer purposes.

Building No. 6 was built of structural steel due to foundation conditions, as the extra weight of a concrete structure was not advisable. However, if it were not for the foundation conditions this structure would have cost less if it had been built of reinforced concrete throughout, including the washer itself, which is of frame construction.

Truck bins and transfer house. Belts are stored in main driveway where photo was taken.

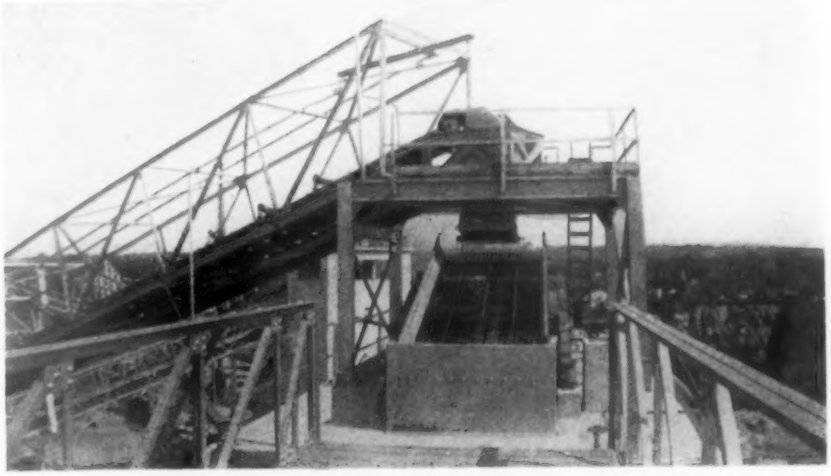
A particular study was made of the structural-steel design for the conveyor galleries, comparison being made between light construction with short spans with many bents and footings and various longer spans and various types of trusses. The final design was adopted as the most economical. Then a study of all the conveyors was made in order to have as much duplication in spans, panel lengths, floor members and top and bottom chord bracing as possible, so as to reduce to the minimum the cost of detailing. The sizes of structural shapes were also standardized wherever economical limits would allow. This duplication of members proved to be very economical when the time came for shop details and the fabrication of the structural steel. The contract for the detailing, fabrication and erection of all the structural steel (about 300 tons) was awarded to the Southern Engineering Company early in January. Erection commenced late in April and, despite the enormous demands for defense purposes, all the steel was on the ground and 90 per cent. of it erected in place three and one-half months later.

The design of the chutes throughout the plant was also a special study. The writer has used chutes made of plate with spring-steel liners for a number of years. After making the general lay-out drawings work was immediately begun on detailing the chutes, including all the belt-loaders. The chutes were made of ¼-inch plate welded with spring-steel liners (SAE1095), of various widths from 4 inches to 6 inches, bolted to the wearing surfaces with countersunk head bolts. These liners vary in thickness from ¼ inch at points of slight wear to ½ inch at points of maximum wear, and may easily be replaced. The main chute box gets no wear and will last indefinitely. All the chutes, wherever practical, are made in box form, the stone running on stone. Due to maintaining minimum centers on all conveyor belts, and a maximum slope of 18 degrees, several angles of intersection between the conveyors became necessary. The box type of chute overcomes all difficulties in chute design and construction.

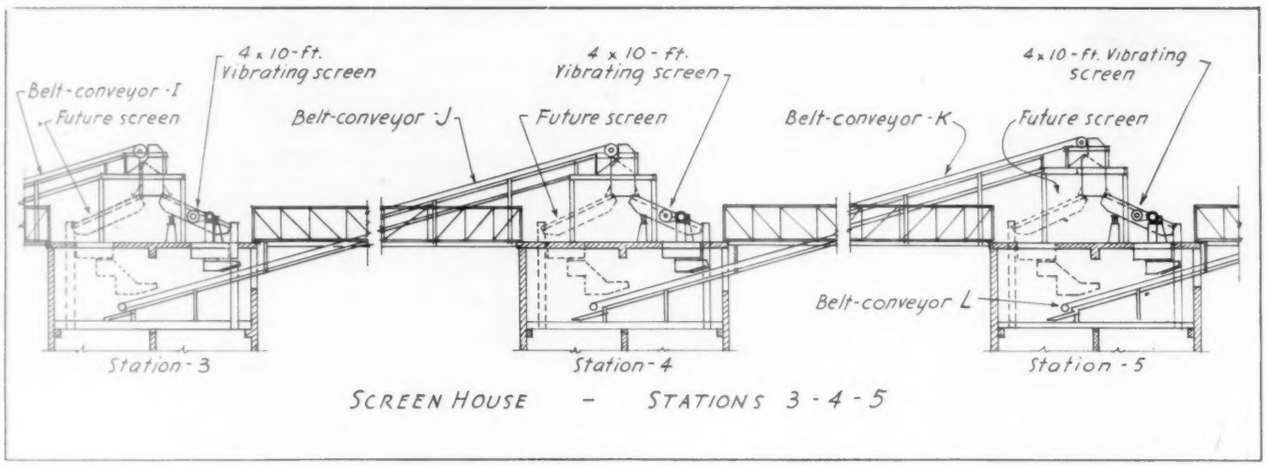
Stone always flows in a uniform rate through an opening, regardless of the height of the pile of stone over the opening. If the least dimension of the opening is not less than five times the maximum dimension of the stone going through the opening, the material will not bridge over the opening. This does not apply to screenings. Stone flows from repose at the rate of 2½ tons per hour per square inch area of the opening. The draw off chute is designed on this basis, and the amount of the flow through this chute is based on a choke feed. Therefore, as the snout of the chute is raised, the flow of the material decreases until it is shut off entirely. In this way, by regulating the position of the snout, any percentage of any size material can be put on the loading-out belt from a series of

View from south showing screening station No. 7 at left.

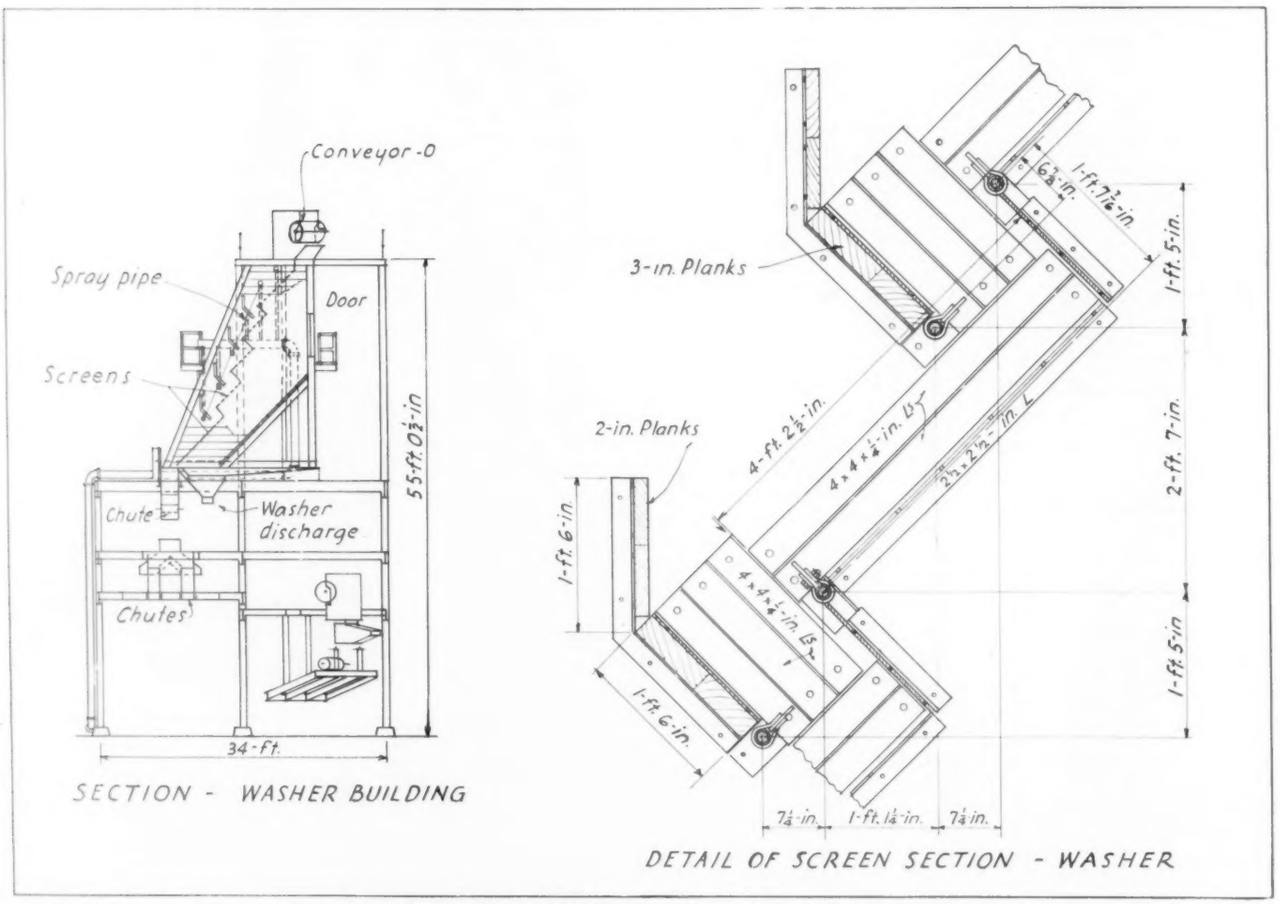
Scalping-screen installation.



Screen installation on Station No. 2 of the screen house.



Elevation details of screening and storage towers.



General plan and details of washer in Building No. 6.

these chutes. The position of the snout is easily regulated by the hand wheel and the ratchet for locking it in place. All the chutes were detailed by H. A. Harnden and M. C. Dow of Newburgh, New York.

The Southern Engineering Company was also awarded the contract for the fabrication and erection of the chutes totaling 40 tons. It found that the design drawings were so complete that no shop details were necessary. It was only necessary to add a bill of material to our tracings before the prints were sent to the fabrication shop!

The flow of the material through the plant is not different, except for a few refinements, from that of the average plant. The screen-house and the method of handling the storage and loading out are entirely different from those found in any other plant in this territory.

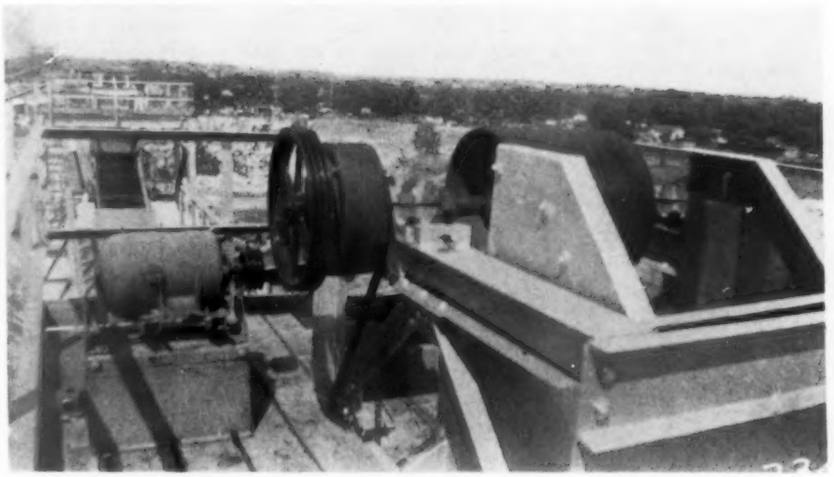
The quarry operation is carried down in 20-foot benches due to the proximity of neighbors. This is done by using a wagon drill at the surface for the first bench and tripod drills for the ensuing benches. The granite in some sections of the quarry is very slabby after primary shooting, and considerable secondary shooting is necessary. Even with the additional secondary shooting, it is necessary to set the primary crusher at 8 inches or less, in order to break these long slabs before they reach the

20-inch secondary crusher. Otherwise, there would be many jams at the secondary crusher. In spite of the slabs after primary shooting, there are practically no slabs or finger stones in the finished product. The amount is only a fraction of 1 per cent.

The 50 B Bucyrus Erie shovel with a 2-cubic yard dipper, loads the material into 6-cubic yard self- and side-dumping Easton bodies mounted on Mack AC trucks. These will later be converted into semi-trailer units. These self-dumping trucks discharge their loads into a hopper over the primary crusher. The stone passes through the 48- by 60-inch Allis-Chalmers jaw crusher and over a grizzly constructed of rails. The fines are discharged through a belt-loader on a 42-inch conveyor *A*. The oversize is also discharged on the same belt-conveyor which has already received a cushion of stone. Where the large stone is discharged on conveyor *A* there are three rubber-covered idlers to give additional protection to the belt. The surge bin under the jaw crusher will hold a full truck-load, so that the crusher will clear itself even if conveyor *A* were to stop. Provision has been made for the installation of a dust-collector system to take the dust away from this point.

Conveyor *A* travels at a speed of 200 feet per minute and has an internal drive and a magnetic head pulley to remove tramp iron. It discharges into a surge bin and the material goes over another grizzly made of rails. Both the primary grizzly and the secondary grizzly will later be replaced with manganese-steel bar grizzlies. The fines pass through this grizzly and bypass the 20-inch Superior McCully secondary crusher. The oversize passes into a surge bin and is fed by gravity to the secondary crusher. Provision is made for the installation of an additional crusher on the opposite side at some future time. Provision has also been made for the installation of a dust-collector system at the crusher discharge. The secondary crusher product is discharged into a surge box and from there on a 24-inch conveyor (*B*) and is started on its way up an 18-degree incline for a distance of 377 feet. It is then discharged on another 24-inch conveyor (*C*) and continues up the 18-degree incline for 278 feet, where it is transferred to a third 24-inch conveyor (*D*) on an incline of 18 degrees for 278 feet. At this point it is transferred to a 30-inch closed-circuit conveyor (*E*) and is then discharged into a surge bin over the scalping screen in No. 3 building. Since leaving the secondary crusher the stone has been elevated almost 300 feet.

The stone then passes over a double-deck Robins Gyrex screen with 2-inch square holes in the top deck and 1¼-inch square holes in the second deck. This screen is driven by a 15-hp. motor and V-belts. The oversize material passes over the screen to a bin feeding the 4-foot Symons cone crusher. A rack-and-pinion gate controls the feed. The minus 2-inch and plus 1¼-inch material go either into another bin and through a rack-and-pinion controlled gate to a 3-foot Symons fine bowl cone crusher, or into the same bin as the minus 1¼-inch material. Provision has been made for the installation of an additional scalping screen when the plant is expanded.



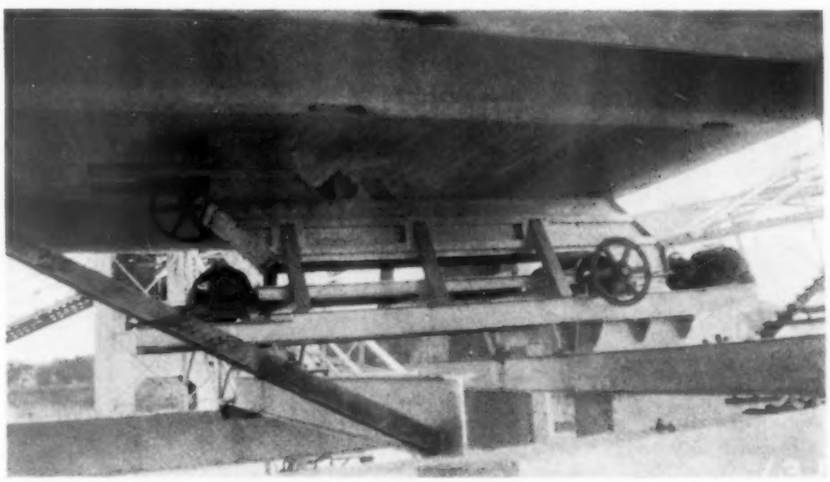
Reducer and drive mounted on a conveyor headshaft.

The stone from the cone crushers passes through a surge bin and is discharged on a 24-inch conveyor (*F*) which in turn discharges it on conveyor (*E*), thus close-circuiting the finishing crusher installation.

Provision has been made for a third dust-collector at the discharge of the cone crushers.

The material in the bin under the scalping screen is drawn off on a belt-feeder, which has a uniform speed of 45 feet per minute. The tonnage is regulated by a rack-and-pinion gate governing the depth of the stream. It will feed, for the present, a uniform flow of 150 tons to 200 tons per hour of stone to a 24-inch conveyor (*G*), which carries the stone up to the screen-house. This is building No. 4 consisting of seven "stations" with screens located at five of the "stations."

On station No. 2 of the screen-house a 5- by 12-foot 2-deck Robins Gyrex screen is installed. This is a duplicate of the scalping screen, and provision has been made for the future installation of a second screen. This screen has 2-inch mesh on the top deck. All the material retained on this deck goes through a chute to an 18-inch conveyor (*H*) and is carried to a concrete silo at station No. 1. This plus 2-inch material is stored only on the inside of the silo, which will hold 500 tons. The second deck of the screen is 1¼-inch, and the minus 2-inch plus 1¼-inch material is discharged to a storage pile in and around station No. 2. Baffle floors have been installed in both the



Feeder from bin under scalping screen which regulates amount of material going to screen house.

BELT CONVEYORS IN PALMETTO QUARRIES PLANT

Mark	Location	Maximum Size of Material[1] (ins.)	Capacity (tons per hour)	Dimensions						Speed (feet per minute)[2]	Drive Pulley Speed (r.p.m.)	Required Horsepower	Motors[3]			Drives[4]			
				Width (ins.)	Length (feet)	Horizontal Length (feet)	Elevation (feet) Top of Head Pulley	Top of Tail Pulley	Rise (feet)				Horsepower	Speed (r.p.m.)	Location of Drive	Speed-reducer Make and Model	Approximate Reducer Ratio	Approximate Chain Ratio	Type and Location of Take-Up
A	Jaw Crusher to 20" Gyratory	10"	200	42"	252.82	241.25	143.25	68.10	75.15	200[2]	21.3	23.85	30	900	Internal	Link-Belt No. 5-10 Reducer	9.91 to 1	4.08	Horiz. Gravity Tail-36" Tr.
B	20" Crusher to B-C Junction	4½"	175	24"	377.26	358.83	233.83	87.25	116.58	300	31.8	25.05	30	900	Head	Link-Belt No. 5-10 Reducer	9.91 to 1	2.77	Horiz. Gravity Tail-36" Tr.
C	B-C Junction to C-D Junction	4½"	175	24"	271.70	258.41	278.38	194.42	83.96	300	38.2	20.00	25	1200	Head	Link-Belt No. D-6 Reducer	15.11 to 1	2.00	Horiz. Gravity Tail-36" Tr.
D	C-D Junction to No. 5 Building	4½"	175	24"	271.70	258.41	353.43	269.47	83.96	300	38.2	20.00	25	1200	Head	Link-Belt No. D-6 Reducer	15.11 to 1	2.00	Horiz. Gravity Tail-36" Tr.
E	No. 5 Building to No. 3 Scalping Bldg.	4½"	325	30"	135.33	128.71	386.50	344.68	41.82	300	38.2	16.17	25	1200	Head	Link-Belt No. D-6 Reducer	15.11 to 1	2.00	Screw takeup 30"
F	No. 3 Bldg. closed circuit to No. 5 Bldg.	1¼"	150	24"	160.51	152.65	362.60	313.0	49.60	200	31.7	8.92	10 o.h.	1200	Head	Link-Belt No. D-5 Reducer	13.58 to 1	2.66	Screw takeup 30"
G	No. 3 Bldg. to No. 2 Sta. Screen Hse. Bldg. No. 4.	3"	150	24"	159.37	151.58	377.0	327.75	49.25	300	47.8	9.24	15 o.h.	900	Head	Link-Belt No. D-5 Reducer	13.58 to 1	1.75	Horiz. Gravity Tail-36" Tr.
H	Sta. No. 2 to Sta. No. 1 Screen Hse. No. 4 Bldg.	3"	120	18"	89.58	89.58	359.0	359.0	0.0	220	41.8	0.75	3	1800	Head	American Pulley No. 3	13 to 1	V-Belt 18.4 to 5.8	18" Prot. Screw Tail
I	Sta. No. 2 to Sta. No. 3 Screen Hse. No. 4 Bldg.	1½"	150	24"	81.23	77.75	377.0	353.50	23.50	200	38.0	4.3	5	1200	Head	American Pulley No. 3	13 to 1	V-Belt 18.4 to 5.8	18" Prot. Screw Tail
J	Sta. No. 3 to Sta. No. 4 Screen Hse. No. 4 Bldg.	¾"	105	24"	80.25	77.0	377.0	354.50	22.50	200	38.0	3.0	5	1200	Head	American Pulley No. 3	13 to 1	V-Belt 18.4 to 5.8	18" Prot. Screw Tail
K	Sta. No. 4 to Sta. No. 5 Screen Hse. No. 4 Bldg.	½"	150	18"	80.25	77.0	377.0	354.50	22.50	280	53.4	4.13	5	1200	Head	American Pulley No. 3	13 to 1	V-Belt 18.4 to 5.8	18" Prot. Screw Tail
L	Sta. No. 5 to Sta. No. 6 Screen Hse. No. 4 Bldg.	⅜"	120	18"	80.44	77.0	377.0	355.75	21.25	220	41.8	3.39	5	1200	Head	American Pulley No. 3	13 to 1	V-Belt 18.4 to 5.8	18" Prot. Screw Tail
M	Sta. No. 6 to Screenings Storage via Truck Bin	⅛"	54	14"	150.0	150.0	359.67	359.67	0.0	180	43.1	2.0	3	1800	Head	American Pulley No. 3	13 to 1	V-Belt 18.4 to 5.8	18" Prot. Screw Tail
N	Tunnel loading out belt—"H" to "O"	3"	450	30"	407.0	407.0	292.04	294.08	—2.04	300	47.8	9.25	15 o.h.	900	Head	Link-Belt No. D-5	13.58 to 1	1.33	Horiz. Gravity Tail-36" Tr.
O	Conv. "N" to Washer No. 6 Building	3"	450	30"	276.26	262.74	369.0	283.63	85.37	300	31.8	44.45	50 o.h.	1200	Head	Link-Belt No. D-8	15.59 to 1	2.72	Horiz. Gravity Tail-36" Tr.
P	Reversible No. 6 Bldg. to "Q" and to Seaboard Ry.	3"	450	30"	69.69	69.69	326.33	326.33	0.0	300	57.2	1.6	5	1800	Head	American Pulley No. 3	13 to 1	V-Belt 18.4 to 5.4	12" Prot. Screw Tail
Q	No. 6 Bldg. to No. 5 Bldg. Truck Bin	3"	450	30"	205.23	195.19	380.42	317.0	63.42	300	38.2	33.16	40 o.h.	900	Head	Link-Belt No. D-8	15.59 to 1		
X	Feeder No. 3 Bldg. to Conv. "6"	3"	150 to 300	42"	10.0	10.0	336.0	336.0	0.0	45[2]	9.6	1.57	5	1800	Head	Link-Belt No. DL-5	43.26 to 1	1.69	Horiz. Gravity Tail-36" Tr.
																		3.1	12" Prot. Screw Tail

[1] **Material**—Crushed granite-crusher run with maximum size material as indicated. Weight—94 pounds per cubic foot.

[2] Speed is fixed ±5 per cent.

[3] **Motors**—All motors to be totally inclosed, fan-cooled squirrel-cage induction type. Constant speed 3-phase, 60-cycle, 550-volt, 55 C. degree continuous rating, and equipped with ball-bearings. No rails required.

[4] **Drive Outfits**—All drive outfits shall be complete units consisting of motor where required, motor bed, reducer, coupling, sprockets, keys, chain, dust- and oil-tight casing.

Reducers—All reducers shall be of the double-reduction type and equipped with Herringbone gears and either sleeve or roller-bearings and dust-proof, oil tight housings. All reducers shall be furnished with structural motor beds. They shall be designed for continuous 10 hour service and rated in accordance with the standards of the American Gear Manufacturers Assn. Flexible couplings shall be included for high-speed side including keys.

Chains and Sprockets—All chains and sprockets shall be made in accordance with Manufacturers (A.S.A.) Standards. Chains shall be equipped with hardened-steel-bushed rollers and shall include coupler links. Sprockets shall be cut-tooth roller chain sprockets and those less than 18-tooth shall be of steel and 18-tooth and over shall be of cast iron. Drives shall be based on minimum centers and shall have dust- and oil-tight casings.

[5] **Pulleys and Pulley Outfits**—All pulleys shall be of cast iron. They shall have crowned faces and be fitted with K.S., S.S. and K.

All pulleys shall be double-arm except for conveyors 18 inches or less in width where they be single-arm.

All bearings 2 7/16 inches and under shall be standard rigid pillow blocks.

All bearings 2 15/16 inches and over shall be extra heavy rigid pillow blocks.

silo at station No. 1 and the screen-supporting structure at station No. 2. These baffle floors reduce the chipping of this size of stone when it falls 64 feet from the screen floor to the top of the roof of the reclaiming tunnel. The minus 1¼-inch material passing through the lower deck of the Gyrex screen goes to a 24-inch conveyor (*I*) and is carried to station No. 3.

Stations Nos. 3, 4, and 5 are duplicates. Each station is equipped with a 4- by 10-foot Robins Vibrex screen, driven by a V-belt drive and a 3-hp. motor. The mesh at station No. 3 is ¾-inch, at station No. 4 it is ½-inch and at station No. 5 it is ⅜-inch. A 24-inch conveyor (*J*) connects stations Nos. 3 and 4 and an 18-inch conveyor (*K*) connects stations Nos. 4 and 5. No baffle floors are required in these stations as minus 1¼-inch stone does not chip appreciably when falling 64 feet or less.

From station No. 5 the minus ⅜-inch material is carried by an 18-inch conveyor belt (*L*) to station No. 6. Here are installed two 4- by 10-foot Robins Vibrex screens with ⅛-inch cloth. Provision has been made for the installation of two additional screens in the future. Due to the small mesh, a larger screen area is required for this station than for any of the other stations.

The minus ⅜-inch and plus ⅛-material are stored in and around station No. 6 structure. The minus ⅛-inch material goes through chutes to a 14-inch conveyor (*M*) which discharges this material into a silo at station No. 7. This building is really a lowering chute, and as it fills up the pressure of the screenings will open doors in the walls letting them slide out on a pile which they form. In this way the dust nuisance is greatly reduced. The local market absorbs all the dry screenings that are produced by the plant.

Between stations Nos. 6 and 7 a truck bin has been installed. This is filled from conveyor (*M*) by means of a stationary tripper. The screenings pile around station No. 7 is loaded into railroad cars by a crawler crane with a ¾-cubic yard bucket.

Between stations Nos. 1 and 6 wooden partition walls are being installed so

BELT CONVEYORS IN PALMETTO QUARRIES PLANT

Pulleys[5]					Spacing (*feet and inches*)		Idlers[6]					Silent Type Hold-Back Required[7]	Belting[8]				Covers		
							Number Required						Carcass						
Drive	Head	Tail	Snub	Bend	Troughing	Return	Troughing	Return	Rubber Covered	Self-Trimming Troughing	Self-Trimming Return		Approx. Length (*feet*)	Plies	Duck Weight (*ounces*)	Friction (*pounds*)	Top (*inches*)	Back (*inches*)	Tensile Strength (*p.s.i.*)
A Two 36″x44″x4[15]	30″x44″x4[15] Magentic	22″x44″x4[15]	.....	Three 12″x44″x2[15] Head, Tail, Drive	3′9″	9′4″	61	24	3	2	2	Yes	530	6	28	20 to 24	1/4	1/16	4000
B	36″x26″x3[15] Lagged	24″x26″x3[7]	20″x26″x2[15]	.....	4′6″	9′9″	80	38	0	3	2	Yes	763	6	32	20 to 24	5/32	1/32	4000
C	30″x32″x3[7] Lagged	20″x26″x2[15]	20″x26″x2[15]	.....	4′6″	9′9″	57	27	0	2	2	Yes	550	5	28	20 to 24	5/32	1/32	4000
D	30″x26″x3[7] Lagged	20″x26″x2[15]	20″x26″x2[15]	.....	4′6″	9′9″	57	27	0	2	2	Yes	550	5	28	20 to 24	5/32	1/32	4000
E	30″x32″x3[15] Lagged	20″x32″x2[15]	20″x32″x2[15]	.....	4′3″	8′6″	30	14	0	1	1	Yes	277	5	28	20 to 24	3/16	1/32	4000
F	24″x26″x3[7] Bore	20″x26″x2[15]	.....	.....	4′6″	8′6″	34	16	0	1 o.h.	1	Yes	327	5	28	20 to 24	1/8	1/32	4000
G	24″x26″x2[15] Bore	20″x26″x2[15]	.....	.....	4′6″	9′9″	34	16	0	1 o.h.	1	Yes	325	4	28	20 to 24	1/8	1/32	4000
H	20″x20″x2[7]	12″x20″x1[15]	.....	.....	4′6″	9′0″	19	8	0	1	1	No	183	5	28	16 to 19	1/8	1/32	3000
I	20″x26″x2[15]	12″x26″x2[7]	.....	.....	4′6″	9′0″	16	7	0	1	1	Yes	167 o.h.	4	28	16 to 19	1/8	1/32	3000
J	20″x26″x2[15]	12″x26″x2[7]	.....	.....	4′6″	9′0″	16	7	0	1	1	Yes	165	4	28	16 to 19	1/8	1/32	3000
K	20″x20″x2[7]	12″x20″x1[15]	.....	.....	4′6″	9′0″	16	7	0	1	1	Yes	165	5	28	16 to 19	1/8	1/32	3000
L	20″x20″x2[7]	12″x20″x1[15]	.....	.....	4′6″	9′0″	16	7	0	1	1	Yes	165	5	28	16 to 19	1/8	1/32	3000
M	16″x16″x2[7] o.h.	12″x16″x1[15]	.....	Two 12″x16″x1[15]	4′6″	9′0″	31	15	0	1	1	No	304 o.h.	4	28	16 to 19	1/8	1/32	3000
N	24″x32″x2[15]	20″x32″x2[15]	.....	.....	4′3″	8′6″	92	44	0	3	3	No	820	5	28	16 to 19	1/8	1/32	3000
O	36″x32″x3[15] Lagged	24″x32″x3[15]	20″x32″x2[15]	.....	4′3″	8′6″	62	30	0	2	2	Yes	561	6	36	20 to 24	3/16	1/16	4000
P	20″x32″x2[15]	20″x32″x2[15]	.....	.....	4′3″	8′6″	12	5	0	2	2	No	145 o.h.	5	28	16 to 19	1/8	1/32	3000
Q	30″x32″x3[15] Lagged	20″x32″x2[15]	20″x32″x2[15]	.....	4′3″	8′6″	46	22	0	1	1	Yes	417	6	32	20 to 24	1/8	1/32	4000
X	18″x44″x2[15]	18″x44″x2[15]	.....	.....	1′6″	5′0″	6	0	0	0	1	No	25	6	28	20 to 24	1/8	1/32	4000

All pillow blocks shall be equipped with grease cups of ample size and with Alemite fittings.

Gravity takeups shall be complete with roller takeup frame and guides and necessary sheaves for ½-inch wire rope to take up weights.

Each pulley outfit shall be a complete unit consisting of a pulley mounted on a cold rolled shaft K., S.S. and K. and include safety set collars, bearings, shaft extensions where required including keyseat and keys, and holdback mounted on headshaft, K., S.S. and K.

Tail-pulley outfits shall be complete in the same manner including gravity takeups or protected screw take-up.

Hold-backs shall be included where required.

[6]**Idlers**—All troughing and return idlers shall have 5-inch diameter rollers except on the 42-inch conveyors where they shall be 6-inch rollers. All troughing idlers shall be of the three pulley type and shall be mounted on steel boards. All idlers shall be equipped with steel tube rollers and roller bearings and dirt proof grease seals. All idlers shall be equipped for complete lubrication from one point on either side. Idlers shall be interchangeable whether on reversible conveyors or not.

Rubber covered idlers shall be heavy-duty type with at least 1 inch of high quality rubber cover.

Self aligning idlers shall be similar in construction and general dimensions to the other troughing and return idlers.

[7]**Hold-backs**—Hold-backs shall be either silent pawl or roller-type and of sufficient size for each particular location. In all cases hold-back shall be mounted on head shaft except conveyor A, where it will be shipped unmounted.

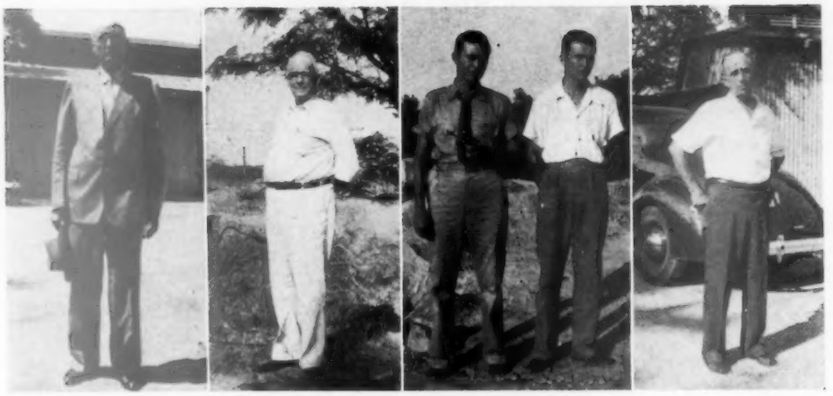
[8]**Belting**—All belting shall be of the quality specified and the duck shall be woven from A-1 American long-staple cotton. When in place all belts shall lie straight and true.

as to segregate the sizes. These walls consist of 25-foot creosoted poles set in the ground and boarded up with 2-inch planking.

Provision has been made for the storage by gravity of 4,000 tons of each size except the plus 2-inch material. By the use of a bulldozer or crane 10,000 tons of each size can be stored in the space available, and 50,000 tons of screenings can be stored. Of the 4,000 tons gravity storage of each size, 85 per cent. can be reclaimed by gravity due to the reclaiming tunnel being located as it is, 16 feet from grade to top of the tunnel-roof.

For loading out purposes a 30-inch conveyor (*N*) is installed in the reclaiming tunnel and passes under all of the screen-house stations. At each station two draw-off chutes are installed to make it possible to draw off practically all the stored stone at each station. The sizes can be blended in any desired proportions on this reclaiming conveyor by which they are discharged on another 30-inch conveyor (*O*) and are carried under No. 5 building, then up to the top of the washer. This is of the cataract type known as the "Barry" washer, named after the inventor who built the first one of this type many years ago at Tomkins Cove, New York. This washer is a series of stationary screens and shelves with movable baffles to retain the stone on the screens and prevent wear on the screen cloth and yet be self-cleaning when the baffles are moved to the dumping position. Flood water is added at the top of the washer, and rinsing water is added lower down, while the bottom screen plates are for dewatering purposes. Twelve hundred gallons of water per minute is used at a pressure of 40 pounds at the nozzles.

The clean stone is loaded either direct into Atlantic Coast Line railroad cars, or on a reversible 30-inch conveyor (*P*), which discharges it into a bin over the Seaboard Air Line Railway track. When reversed, conveyor *P* discharges on a 30-inch conveyor (*Q*), which carries the stone to the top of the truck bins in building No. 5. Conveyor *Q* discharges into a swivel chute which is controlled from the ground



G. D. Lott, president; T. M. "Cap." Hanna, superintendent; G. D. Lott, Jr., vice-president and Hamilton Lott, chief engineer; Samuel Dreyfus, secretary and sales-manager.

and will discharge into any one of six truck bins having a capacity of 50 tons each or on to conveyor *E*, thus returning the stone to the screen-house.

This swivel chute also can discharge into a chute going to a storage pile on the outside of station No. 1 of the screen-house. This storage pile is minus 3/16-inch and plus 100-mesh material which is made as follows: The sludge from the washer is discharged into a sand-drag box and the weirs are set so as to reclaim plus 100-mesh, the minus 100-mesh being wasted and flumed away with the water. The plus 100-mesh is discharged from the sand-drag into a short elevator leg and stored in a steel bin over conveyor *Q*. This bin holds 25 tons and when filled, it is discharged on conveyor *Q* and in a few minutes is stored around station No. 1 of the screen-house and can be loaded out again on conveyor *O*. Conveyor *O*, which goes to the washer, passes under a bin below the driveway floor of building No. 5. Any surplus stone in the trucks or in any of the six truck bins, can be dumped into this bin and loaded on conveyor *O* and be returned to the screen-house.

Trackage is provided for 35 empty cars above the washer and 35 cars below the washer on the A. C. L. railroad with a down grade of 1½ per cent. for the "empties" and 1 per cent. for the loaded cars. Space is reserved for the same number of cars on the S. A. L. railroad. The loading-out capacity of the convevors is 450 tons per hour.

The electric control system was laid out by the writer and detailed by G. H. Preacher of Columbia, South Carolina. The entire plant is interlocked so that if any conveyor stops, all those ahead of it automatically stop. A signal system is provided and there is a selective-ring common-talk dry-cell telephone system throughout the plant. All the motors, except those for the crushers, are push-button controlled with magnetic starters and emergency stop buttons at convenient locations. All the wiring is concealed in conduits, except for two heavy runs which are open and supported on the tops of the conveyor galleries.

All the conveyor equipment including roller-bearing idlers, pulley outfits, silent pawl holdbacks for all the inclined conveyors, self-alining idlers and screens, were furnished by the Robins Conveying Belt Company.

All the conveyor drives of 10 horsepower or over are Link-Belt speed-reducers direct connected to General Electric motors, mounted on a common base and connected to the head shafts by roller chains totally inclosed in dust-tight housings.

All the 5-horsepower conveyors are driven by Allis-Chalmers motors mounted on tension base, made by the American Pulley Company and connected by their V-belt drives to American Pulley speed-reducers mounted directly on the conveyor head shafts. This type of drive is new, and is certain to appeal greatly to the stone industry, due to its simplicity and ease of installation.

The structural-steel design work was carried out by Hamilton Lott and the field engineering by George D. Lott, Jr., both sons of George D. Lott, and recent civil-engineering graduates of the Citadel. George D. Lott, Jr., is vice-president of the company and Hamilton Lott is chief engineer. T. M. Hanna is superintendent of the plant and Samuel Dreyfus is secretary and sales manager.

All of the lay-out, design, detail engineering and construction was carried out under the direct supervision of the writer. The detail concrete plans and final general plans were drawn by Brunner & Laws of Chicago, Ill.

The new plant is nearing completion and the old plant will be shut down December 1, 1941. The crushers will then be moved to their new locations under the direction of Mr. Hanna. The primary and secondary crushers will be lowered 200 feet to the quarry floor. The heaviest single piece weighs 32 tons, and one of the company's derricks is being relocated so as to handle this work. This same derrick can load out jetty stone from its new location. All the machinery is being installed by the owners, with their own forces which have been augmented for this purpose. It is planned to have the new plant in operation early in January of 1942.

The entire plant lay-out and design is based on flexibility of operation, future requirements, and the ability to give the finest of service to its customers.

Asphalt Shortage May Curtail Road-Building

Serious curtailment of road-building activities during 1942 in the Atlantic seaboard area is in prospect as a result of heavy federal buying of asphalt for army cantonments and airports, the New York *Journal of Commerce* reveals.

The oil-tanker shortage is also aggravating the situation inasmuch as the petroleum industry is unable to move much crude oil to asphalt manufacturing plants on the East Coast.

Government purchases of asphalt for cantonments and air fields in the Atlantic Coast district have been so heavy that some manufacturers have been forced to drastically curtail sales to private buyers, it is reported.

The asphalt industry is not now subject to priorities, but some producers anticipate the need for them will arise shortly. Government purchases are expected to reach a peak next year. Together with anticipated additional tanker curtailment, this means that major road programs utilizing asphalt may have to be deferred indefinitely in some states.

Federal requirements for asphalt have already been much greater than anticipated. Original specifications on government construction jobs were not so large, but calls for additional quantities have been sent out in almost all instances. One federal project has already required five times as much as the original specifications called for, it is said. The asphalt industry would welcome priorities, according to trade representatives, inasmuch as it is at present having difficulty in supplying material already provided for.

One manufacturer is said to have made no new private commitments during the past 60 days in order to be able to fulfill government needs in full. A large Eastern municipality recently asked for bids on a substantial quantity for street repair work. Not a single bid was received, it is reported, because the suppliers simply did not have the asphalt to sell.

Improvements at Marquette's Plant at Des Moines Will Lower Operating Cost

SINCE acquiring the plant and properties of the Hawkeye Portland Cement Company at Des Moines, Iowa, September 1, 1940, the Marquette Cement Manufacturing Company has been engaged in a program of improvements, which, when completed, will greatly increase the efficiency of operations, simplify the process of manufacture, and materially reduce production costs.

It was appreciated when the plant and properties were taken over, that much of the machinery, buildings, and equipment could be utilized to advantage, but that modernization in the quarry, crusher, raw grinding, kiln and power departments would be necessary before these departments could function at maximum efficiency. Also that a comprehensive system of mix-making and mix control would be required in order to establish uniformity of the finished product and to produce effectively the various classes of cement demanded.

During the past year considerable progress was made. Quarry improvements were completed, 50-ton raw-material-haulage cars were placed in service between the quarry and the plant, new machinery was installed in the crusher department, a Diesel-electric locomotive for yard switching was placed in service, and a new spray pond added to the power department. Also during this interval, plans were prepared, machinery purchased and contracts awarded for a new raw-material storage, raw-mill structure, kiln building, and power plant additions.

As it is the policy of the Marquette Cement Manufacturing Company to use concrete construction wherever possible or advantageous, all new buildings and additions will be built accordingly, with special emphasis placed on structural details and architectural effects. The use of steel, other than concrete reinforcements, will be limited to the machinery, protective devices, and machinery connections.

Quarry operations, as now practiced, are limited to stripping, drilling, blasting, loading and switching loaded cars and empties between the quarry and the Rock Island Railroad siding two miles distant. Stripping is done by contract with highly-efficient equipment and on a large-scale basis. Sufficient overburden is removed at a time to uncover a two or three-year supply of limestone. During the past winter months 638,000 cubic yards of overburden were disposed of.

Face drilling is accomplished with a special, self-contained machine designed to fit the prevailing conditions. The unit is tractor-mounted, Diesel-driven, and carries two air compressors and two 4-foot derrick drills on universal supports. The drills are similar to wagon types and operate in much the same manner. The compressors have sufficient reserve capacity for whatever secondary drilling is found necessary.

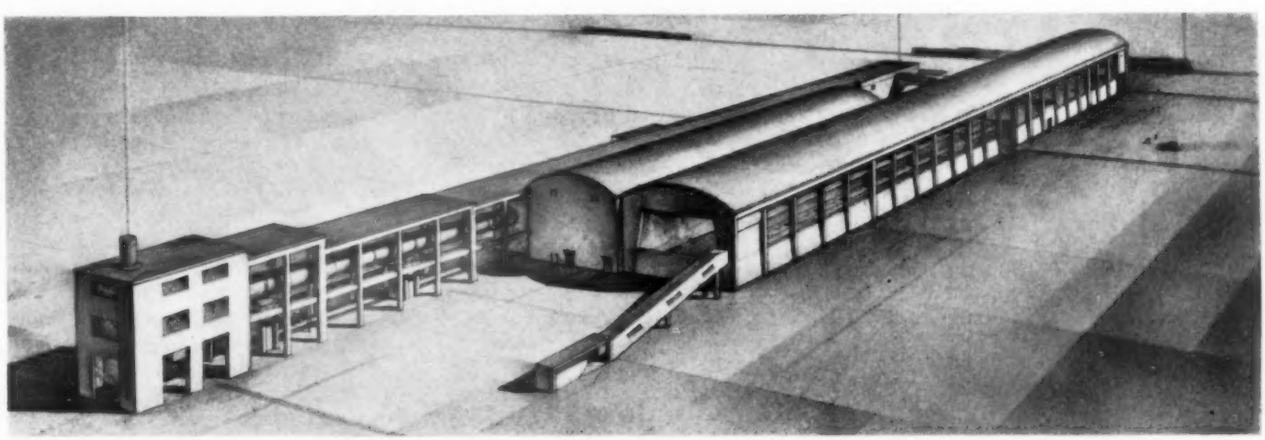
A 2¾-cubic-yard Diesel shovel, of the tractor type, loads the raw materials directly into standard 50-ton gondola cars. Cars are spotted in units of five and loaded and moved without uncoupling. In order to release the quarry locomotive for other purposes during car-loading operations, a special Diesel-driven, tractor-mounted, car puller with attached drum and cable machinery was built.

The locomotive is a 65-ton, General Electric-Diesel-electric type with sufficient speed and power to deliver five loaded 50-ton cars to the Rock Island siding and return with an equal number of empties every thirty minutes. The rail distance from the quarry to the plant is 30½ miles. Car movements are over the Rock Island tracks and occur once every twenty-four hours in both directions. Quarry operations are on an eight-hour, five-day basis.

In addition to the new equipment installed, other quarry improvements consist of new washroom and locker facilities, heating system, first aid room, new water supply, Diesel generator and portable Diesel air compressor.

The crusher department, located at the cement plant, remains practically the same and functions essentially the same as formerly. The car-unloading and primary-crushing machinery were not altered. The secondary crushers, however, consisting of a combination of two hammer mills, a classifying screen, and two pan feeders, were replaced by one Gruendler Type XXB hammermill driven by a 300-h.p. Allis-Chalmers synchronous motor. A pan feeder of the same width as the Gruendler-mill feed opening was added. Minus ¾-inch material is now being produced at the rate of 250 tons per hour. Other than some slight modifications to the crusher building and some changes in the wiring system, no further alterations to the crusher department are contemplated.

The major part of the new construction program consists of three monolithic concrete buildings, arranged adjacent to each other and in available space parallel to the present kiln build-



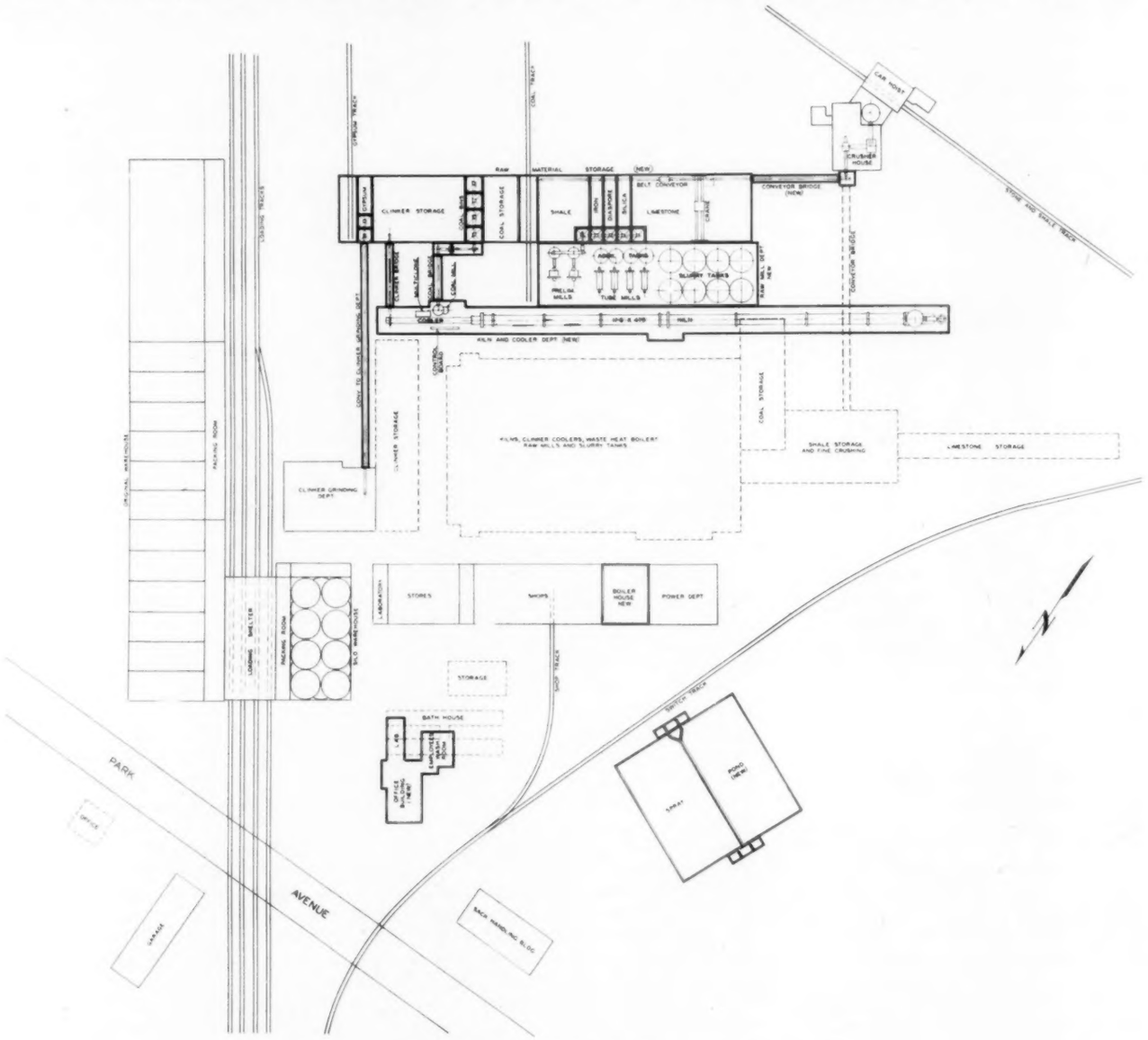
Architect's conception of how the plant will appear when completed.

ing. These buildings will house all the new raw-material-storage facilities and equipment, the raw-grinding machinery, slurry system, kiln, clinker cooler, and coal-preparation machinery.

coal bins and the other adjacent to the gypsum bins. A 30-inch belt conveyor, with motorized tripper and supported by cantilever brackets, extends from the crusher house to the end of the limestone bins, a distance of 240 feet. A 75-foot crane operates for the entire length of the building. This crane is 37 feet above floor level.

tion of limestone, shale, or admixtures desired.

Four concrete coal bins extend across the storage building between the coal and clinker-storage spaces. These bins



Plan showing additions to Marquette's Hawkeye plant at Des Moines.

The raw-materials-storage building is approximately 500 feet long, 80 feet wide and 60 feet high, is constructed of concrete columns, crane girders and arched concrete roof. Twelve-foot retaining walls between the columns longitudinally and cross wall divide the structure transversely into seven storage bins for the various materials that are to be contained. Taken consecutively from one end of the building to the other, the storage bins contain limestone, silica, iron cinders, diaspore, shale, coal, clinker, and gypsum.

Two standard-gage tracks, parallel to the cross walls, pass through the building at yard level, one adjacent to the

Five raw-material feed bins, arranged in a row, served by the crane, and fitted with individual constant-weight Hardinge feeders, are located at the raw mill side of the storage. The feeders are electrically interlocked and any one or more may be cut in or out of service as required. The preliminary mix is started at this point with any combina-

have sufficient capacity for two days of kiln operation and may be filled by the crane either directly from cars or from the coal storage. A combination drag and feeder conveyor removes the coal uniformly and simultaneously and delivers the fuel for further processing.

Clinker and gypsum feed bins with Hardinge interlocked constant-weight feeders are located between the clinker and gypsum storages and discharge on a conveyor passing to the clinker-grinding department.

The raw mill building, parallel and adjacent to the raw-materials-storage building, is 240 feet long, 72 feet wide and 55 feet high, is a totally enclosed

building and of same general construction as the raw-materials-storage building. The building will contain the preliminary-grinding units, the raw tube mills, the slurry and admixture tanks, and the necessary auxiliary equipment.

As previously stated, the preliminary mix will originate in the raw storage and be proportioned by the feeders under the feed bins. It will then pass, by a combination of conveyors and elevators, to two 50-ton-capacity preliminary-mill feed bins. Poidometer feeders and constant-pressure water meters will regulate the quantities and the ratio of raw material and water entering the preliminary-grinding units.

The first stage in reduction will be accomplished by two Allis-Chalmers preliminators driven by 250-horsepower 2,200-volt synchronous motors. The mills are 9 feet 6 inches in diameter, 5 feet 6 inches in length, and are in closed circuit with 4- by 6-foot, totally-enclosed, Utah vibrating screens. One screen is provided for each mill, but structures are arranged for additional screens if found desirable. Four-inch centrifugal pumps, driven by 10-horsepower motors, will deliver the mill product to the screens, oversizes will return to the mill inlets, and fines to an agitated surge tank located between the preliminary and secondary grinding units.

The four Smidth Type E-18 tube mills with motors and control equipment now in service, will be transferred to the new location and form the secondary stage of the grinding. These units will be fed by special individual Ferris wheels which will receive their supply from, and return the overflow to, the surge tank.

The slurry-storage and mix-control system will consist of eight 25 foot 6-inch diameter and four 15-foot diameter concrete tanks, 39 feet high, all equipped with Minogue agitators. In addition to air and mechanical agitation, large-volume circulating pumps will be provided for homogenizing and transfer purposes.

The four 15-foot tanks will be used for high-lime, high-iron, high-alumina, and high-silica slurries, and will supply whatever corrective mediums may be necessary for final mix correction. These tanks will also be of service when producing special cements. The eight 25 foot 6-inch tanks will have a capacity sufficient for four days of kiln operations. The tanks will be used progressively in pairs.

In controlling the composition of the mix with the proportioning and corrective methods provided, periodic analyses of the raw materials, as received, will be made. From the analytical data thus secured, the ratios of the various components will be fixed at the constant weight-feeders. Slurry will then be prepared in daily batches and thoroughly homogenized by the system of agitation and circulation provided. After sampling, the slurry will be held twenty-four hours for complete analysis, which will determine what corrections, if any, will be required. The special slurries, previously prepared and stored in the admixture tanks, will then be added for final correction. Then after a final check analysis, the slurry will be released for use.

A 25-ton traveling crane will be installed over the machinery in the raw-grinding department and used for repairs as well as for initial erection purposes.

The kiln building, forming the third unit in the new group of structures, will be 635 feet long, vary from 30 to 45 feet in width, and have an average height of 47 feet. The feed and cooler ends and that portion of this building adjacent to the raw mill are enclosed, the side walls being omitted for other portions. The closed parts of the kiln building are ventilated by means of power-driven fans, no dependence being placed on natural ventilation. It will house the kiln, clinker cooler, coal-preparation machinery, kiln-feed mechanism, and departmental auxiliaries.

The Allis-Chalmers kiln now under construction will be 475 feet in length, and 11 feet 6 inches in diameter. It will have a slope of $\frac{7}{16}$ inch per foot, rest on seven sets of carrying rolls and be driven by a 125-horsepower variable-speed motor. The kiln will be completely lined, partly insulated, and equipped with 19,600 lineal feet of $\frac{3}{8}$-inch chain extending over 105 feet of shell in the drying zone. A motor-driven Ferris wheel, operating through a synchronous tie with the kiln motor, and speed changer, will control the feed.

A Bailey fan, with 105,000 cubic feet-per-minute capacity at four inches of static pressure and driven by a 200-horsepower motor will handle the exit gases. Louver dampers, inserted in the fan-inlet connections, and automatically controlled, will maintain constant draft conditions.

Clinker will be discharged into an Allis - Chalmers air - quenching - type cooler, with a grate length of 100 feet. Because of foundation and structural conditions, the cooler was placed continuous with the kiln. This accounts for the length of the building required. In order to avoid any loss of clinker dust from the cooler-waste air stack, a Multiclone system of collection will be installed. Clinker emerging from the cooler will be weighed and conveyed to the clinker storage in the raw-materials building.

A novel feature of the kiln and cooler installation will be an air-jacketed kiln end and an air-jacketed seal. The parts subjected to high temperature will be of heat-resisting steel and air for cooling purposes will be supplied by an independent blower unit.

Kiln fuel will be prepared by a No. E-56 Babcock & Wilcox mill, with mill and fan separately driven. The unit will be located in close proximity to the kiln. Preliminary fuel preparation will be done by a hammer-mill preceded by a magnetic separator.

All kiln, cooler, coal-preparation, and kiln-feed operations will be controlled from a common point at the burner platform. Recording and indicating instruments of every kind, as well as gas-analyzing apparatus, rheostats, and motor-starting devices, will be mounted on a specially-built switchboard located convenient to the kiln operator.

The clinker-grinding department will continue to operate as it is. Except for some improvements to auxiliary equipment, which have been completed, no alterations will be made. Smidth Kominuters with outside screen classification and Smidth tube mills comprise the grinding machinery.

The silo warehouse with its packing machinery was built in 1923, serves its purpose and will continue to be used as it is. The capacity is 150,000 barrels. The original warehouse, although obsolete, will continue in service for the present, and be used as an overflow storage. Eventually, it will be replaced with a modern structure, packing plant, and bag-handling equipment. Its capacity is 205,000 barrels.

The shops, storeroom and laboratory, all housed in one structure, will continue in use without major alterations. Additional shop equipment was installed during the past year. The chemical and physical laboratories were completely modernized and rebuilt in 1939.

Construction will start shortly on a modern office building, which, in addition to the plant offices, will contain locker and bath facilities for all employees. Architectural concrete will be used throughout.

Because of the characteristics of the new kiln installation and the consequent low temperature of the exit gases, no provision will be made for waste-heat recovery. To compensate for this condition, a 450-pound pressure, 55,000-pound-of-steam-per-hour, Babcock & Wilcox boiler, with all necessary auxiliaries, will be installed in the power department. The boiler will be fired with pulverized coal, prepared by two Babcock & Wilcox mills, transferred from the present kiln department. New fire pumps, fire-protection lines, switchboard extensions, and coal and ash-handling machinery will be included in the power plant improvements.

THE EFFECT OF ALKALIES ON CONCRETE

By GABRIEL ASH

VERY recently the attention of cement experts in this country has been attracted to the problem of the effect of cement alkalies on concrete. Some deformations of concrete constructions have been ascribed to the presence of high alkali contents in cement. It is evident that the cement manufacturers are highly interested in investigations of whether, and in what way, a relatively small proportion of alkalies may cause serious deterioration of concrete.

Alkalies are widely distributed in nature and consequently are present in raw materials used in cement manufacture. However, the amount of them is small and the alkali contents of cements range from 0.6 to 1.4 per cent. In rare cases it is below or above this range. Alkalies are volatile at temperatures above 1,000 degrees C. and this accounts for the fact that the proportions of alkalies in cement clinker are smaller than they should be expected to be from the composition of the raw materials and that of the ashes of the fuel. The volatization of the alkalies is responsible for the fact that the dust from cement kilns contains more alkalies than the clinker produced.

It is customary to present the proportions of alkalies in cement as oxides. It is obvious, however, that the alkalies do not exist in cement in the form of free oxides or hydroxides. Yet, we know relatively little about the form in which they do exist in cement clinker. With respect to sodium it has been established that in lime-rich mixes a compound of the formula $8CaO.\ Na_2O.\ 3Al_2O_3$ is formed.[1] It is generally agreed that this compound exists in Portland cement.

According to Messrs. H. Insley and H. F. Murdie,[2] "laboratory prepared clinker composed of CaO, Al_2O_3, Fe_2O_3, and $Si\ O_2$, when cooled at moderate rates, contains rectangular dark interstitial material, whereas the same preparation with small amounts of Na_2O, K_2O, or both, contains prismatic interstitial material. The latter has properties very like those of the compound discovered by L. T. Brownmiller which he described as having the composition $8CaO.\ Na_2O.\ 3Al_2O_3$."

We know no more about potassium. Brownmiller [3] established that $K_2O.Al_2O_3$ is the only compound of potassium in the system lime-alumina-potassium oxide which exists in compositions related to the constituents of Portland cement.

W. C. Taylor in his studies [4] on the system lime-alumina-iron oxide-potassium oxide did not observe tertiary compounds containing K_2O. The system alkali oxide-lime-silica has been studied, too, but the results are not conclusive, though there are indications that alkalies may react with other constituents of cement forming combinations such as x Alk. $y\ SiO_2$, or x Alk. y $CaO.\ z\ SiO_2$.

Though little is known about the composition and form of alkali compounds in cement, it has been established that there are two kinds of them: one is more easily soluble in water than the other. Yet, despite the fact that the alkali content of cement is small and the amount of those which are more easily soluble in water is still smaller, it was found a long time ago that they cause some undesirable phenomena.

Thus, the scum or efflorescence may be caused by the presence of a higher alkali content. Usually this phenomenon is ascribed to lime hydrate liberated during the setting of the cement and brought to the surface as a result of capillary action and porosity. In some cases, however, the chemical examination of the efflorescence on brick work or on cement tiles gave evidence of the presence of alkali salt in the scum. According to F. M. Lea, "the staining of limestones set in concrete mortar and the failure of paint films on concrete has also been traced to the content of water-soluble alkalies in cement." I wish to stress the fact that efflorescence may be caused by other factors. An excess of mixing water, its composition, dirty aggregates favor the formation of scum. I had an opportunity to establish that the efflorescence on cement slabs, ascribed to the presence of "free lime" and an excess of alkalies in cement, was due to the hardness of the mixing water and the impurity of the sand used.

Another unpleasant phenomenon is probably due to a high alkali content. In the cement literature there are described cases of a normally-binding cement, which, after a certain time of storage, suddenly becomes a "fast-binder." Various reasons have been advanced to explain this reverse in setting time. One of them is the presence of reducing substances in the clinker, due to the burning of the raw mix with an insufficient supply of air. I observed such a reversal caused, probably, by the presence of an excess of alkalies. I was connected with a plant which used the dust from cement kilns as an admixture to the clinker. The addition of kiln dust to the mills is not unusual and in many cases does not affect unfavorably the finished product. In this special case, however, the cement which showed an acceptable initial time of setting of 60 minutes (Vicat), after 3 months' storage showed a sharp reversal in setting time. Its initial time of setting changed from 60 to 5 minutes. The cement did not possess reducing properties. Its alkali content was about 1.5 per cent. After some reconsideration I proposed to refrain from the use of dust as an admixture. The suggestion was followed and the cement without dust showed normal behavior. Whether the increased amounts of alkalies or the presence of a certain kind of alkalies existing in the kiln dust caused the mentioned reversal was not established. I do not intend to generalize this evidence, because I am aware of cases where kiln dust is used without harmful consequences. Besides, we know too little about the *rôle* of alkalies in the process of hydration to advance definite conclusions.

Thus, until recently the major trouble ascribed to the presence of alkalies in cement was the phenomenon of efflorescence. This defect, however, did not create an acute alkali problem; first, because it has also been found that efflorescence is caused by calcium hydroxide released during the process of hydration—a factor which can not be eliminated; secondly, because efflorescence could be removed or reduced by adding certain substances to the concrete mix.

Quite recently, however, the problem became acute in this country. It has been observed that concrete made of cement with a higher content of alkalies is liable to considerable extension, especially when certain kinds of aggregates are used. In 1940 T. E. Stanton, Jr.,[5] material and research engineer of the California State Division of Highways, described such an injurious effect due to alkalies. He said: "Following serious deterioration of a con-

[1] Brownmiller (L.T.), American Journal of Science, 23, p. 501 (1932).

[2] Journal of Research, Bureau of Standards, R. P., p. 1074, February, 1938.

[3] American Journal of Science, 29, p. 269 (1935).

[4] Journal of Research, Bureau of Standards, R. P., p. 1131, September, 1938.

[5] Engineering News-Record, February 1, 1940, p. 171.

crete pavement, a careful search for the causes showed that relatively high alkali in the cement caused destructive chemical combinations when chert and shale were present in the aggregates. Alkali in the cement in the form of sodium oxide was suspected as a contributing factor because it seemed possible that the expansion might result from a combination of certain ingredients in the aggregates with the alkalies."

In accordance with this experience, the California State Division of Highways issued a cement specification limiting the total amount of alkali in cement to 0.50 per cent. Such a resolute decision, if adopted by other constructional organizations, would certainly result in unpleasant consequences for the cement producers of this country.

As a matter of fact, according to the best of my knowledge, the great majority of the American brands do not comply with this limitation. I am not in a position to give exact data as to the proportions of alkali in all American cements on the market. It may suffice, however, to state that of 38 cements described in the Report of the Working Committee on Volume Changes and Soundness of Portland Cement [6] only 7 brands showed an alkali content of 0.50 or less per cent. The rest contained from 0.59 to 1.24 per cent., the average percentage amounting to 0.83 per cent. Similar data may be found in other sources: W. C. Taylor, giving the results of the analysis of 23 commercial clinkers, states that "Na_2O and K_2O each was present in all clinkers. The amount of the former varied from 0.1 to 0.7 and the amount of the latter was 0.3 to 0.6. The average percentage of each was 0.3 and 0.6 respectively."

In addition to the observations described by T. E. Stanton, Jr., new facts about cracking in concrete due to the reaction between aggregates and high-alkali cements were presented by H. S. Meissner, engineer of the United States Bureau of Reclamation at Denver.[7] According to him, "Extensive expansion has been recognized for some time as causing that type of concrete distress manifested by a characteristic random-pattern cracking. . . . It has been ascribed variously, sometimes especially to unsound aggregates or unsound cement, the latter further subdivided into high-free-lime and high-magnesia cements. Recent disclosures point to an additional new explanation in the chemical reaction between high-alkali cement and the mineral constituents of certain aggregates."

[6] Proceedings, A.S.T.M. v. 36. (1936), pt. 1, p. 230.

[7] Journal, American Concrete Institute, April, 1941, p. 549, *et seq.*

Cracking of this kind has been found on Parker Dam, a concrete arch structure spanning the Colorado River 155 miles below Boulder Dam. Parker Dam was constructed in the year 1938. A few cracks were noticed right after its completion. Two years thereafter these cracks "were discovered to be enlarged, and numerous new cracks were observed to appear suddenly and to extend themselves rapidly." Cores taken from the defective concrete showed less compressive strength than those taken 2½ years previously during the construction of the dam and a sharp decrease of the modulus of elasticity. It has been observed that air-void spaces in the cores were filled with a mushy, clear-to-opaque white gel "consisting essentially of alkalies silicates."

In my opinion the presence of silica and alkalies in the deposits in the void spaces of concrete does not present direct evidence that the aggregates used in Parker Dam were chemically attacked by the alkalies in the cement. We know that the latter are present in reactive compounds and that a certain portion of them is rapidly released during the early stages of hydration. Wherefore it is not surprising to find the void spaces filled with alkali-containing gel.

The chemical analysis of this deposit showed:

	SiO_2	R_2O_3+ insoluble	CaO	MgO	SO_3	Na_2O	K_2O	Loss
Beads	51.2%	.....	.....	.....	.....	16.8%	.....	.....
Material from side of core	81.0	0.7%	1.1%	.....	.....	4.0	2.0%	10.5%
Material from interior of core	53.4	1.5	4.7	.....	.....	7.0	4.5	20.5

The results of this analysis do not prove that the deposit consists "essentially of alkalies silicates." The percentage of alkalies is too small. According to these results the greater part of the deposit consists of silica. Should the deposits in the voids result from chemical action of the alkalies on the siliceous ingredients of the aggregates, the ratio between the alkalies and silica would be different. Na_2O and SiO_2 combine together in the proportion of about 1 to 1 by weight.

The comparative mortar-expansion tests described by H. S. Meissner do not provide direct evidence either. The fact that 1:3 mortar bars made of cement containing 1.3 per cent. total alkalies showed a smaller expansion than similar bars made of the same cement to which 1 per cent. of sodium hydroxide was added proves only that an addition of sodium hydroxide affects the expansion of the mortar. I do not think that it is of any advantage to use sodium hydroxide solution as a comparative reagent with the intention of showing possible action by the cement alkalies. Alkalies do not exist in cement in the form of hydroxides. They are combined partly with the natural constituents of cement, partly with SO_3, and sometimes with CO_2.

However, I do not deny that cement alkalies may affect the grade of expansion of set mortar. Several years ago H. F. Gonnerman examined the expansion of a series of cements by means of autoclave tests.[8] The results indicate that a group of cements with an average alkali content of 0.56 per cent. showed the smallest extension equal to, or less than, 0.02 per cent., whereas another group with an average of 0.90 per cent. of alkali content expanded from 0.02 to 0.099 per cent.

Of course, it can not be ascertained whether this difference in expansions depends upon the contents of alkali only. Because, among the examined cements were some containing 0.36 and 0.46 per cent of alkalies, and these, despite the low proportion of alkali, showed an expansion of more than 0.1 per cent.

Even taking for granted that a higher content of alkalies in the cement increases the expansion of the cement paste, examination of the cores of Parker Dam concrete does not show an excessive extension of the proper binding material (cement gel). "There was no visible indication that the free gel itself was causing the expansive pressure, as in most cases, it did not even fill the voids in which it was located."

On the other hand, it is hard for me, a chemist, to understand how the minute difference in the proportion of alkalies in the cement, amounting to tenths of one per cent., can cause harmful chemical reactions on such substances as shale, siliceous limestone, andesite, rhyolite, chert granite and granite gneiss. I know that the direct action of a strong solution of alkali hydroxides in water on such minerals requires weeks in order to bring noticeable results under normal temperature conditions.

During the process of hydration some constituents of cement, such as $8CaO.Na_2O.3Al_2O_3$, may release its alkali in the form of a hydroxide. But it is quite certain that this alkali hydroxide will be converted into an alkali carbonate, or it will combine with the existing soluble silica of the cement gel long before it will be able to attack siliceous minerals in the aggregates.

[8] Proceedings of A.S.T.M. v. 36 (1936), pt. 1, p. 230.

Yet, Stanton established the fact that a particular cement, liable to produce good concrete with certain aggregates, proved to be defective when other aggregates were used. The latter aggregates, however, when mixed with another brand of cement produced a good concrete.

On the other hand, Meissner states that evidence has been obtained indicating that the aggregates were chemically attacked while in concrete: "Five-year-old laboratory specimens of concrete made with Parker Dam aggregates and a cement containing 0.91 per cent. alkali showed a deposit of them and also revealed defective andesite aggregates in pop-outs on their surface."

The cement specification of the California State Division of Highways limits the total alkali in cement to 0.50 per cent., being of the opinion that this limitation insures a good behavior of the concrete made with this cement and sensitive aggregates. Thus, an excess of 0.4 per cent. seems to be harmful. For the construction of Parker Dam four brands of low-heat cement were used. Their contents of alkalies were: 0.55, 1.13, 1.24, 1.42 per cent. respectively, giving an average of about 0.9 per cent. One of the cements used distinguished itself by a rather unusually high proportion of alkalies. I wish to say that, despite this fact, only "some slight difference was observed in the trash track buttresses between *concrete in which all four cements were used and that in which one brand alone* (containing the highest alkali) was used. The difference of 0.50 per cent. between the average alkali contents in the four cements and that of the highest alkali cement should reveal itself in more drastic differences in cracking.

Besides, it is worth mentioning that "of many and complex types of rocks noted in the Parker Dam aggregates, only a few show perceptible activity in the sample of defective concrete." In addition, "some of the rocks that have shown activity within the concrete appear to have had their surface rendered vulnerable to attack by weathering."[9]

The latter fact forces me to advance a somewhat cautious presumption that not all the types of rock used in the Parker Dam aggregates were fit to be used.

The entire picture of these new revelations about the chemical action of cement alkalies on the aggregates is rather puzzling. I have already said that I admit the possibility of volume changes due to the high alkali contents in cement. There are indeed, reasons for the probability of such an effect. Experiments show that the burning of mixes, similar to those used for the production of cement clinker, result in the formation of "free lime" by an increase of the proportion of alkali, the other ingredients and temperature remaining unchanged.[10] But, the augmented extension due to the higher contents of alkalies must reveal itself in the various tests for soundness and volume changes. However, I refuse to believe that an alkali excess of a few tenths of one per cent. can chemically affect the siliceous ingredients of the aggregates. According to some assertions, it appears that even total alkali contents of 0.6 per cent. "are sufficient to cause concern particularly with rocks or minerals such as andesite, certain cherts, feldspars etc."[11] Apart from the pure chemical considerations already mentioned, it is hardly believable that such small amounts of alkalies dissolved in a large quantity of mixing water and dissipated in a mass of concrete several hundred times larger can have a far-reaching effect on the minerals of the aggregates. There must be some other reasons and I am certain that further and more comprehensive studies will bring a more convincing explanation.

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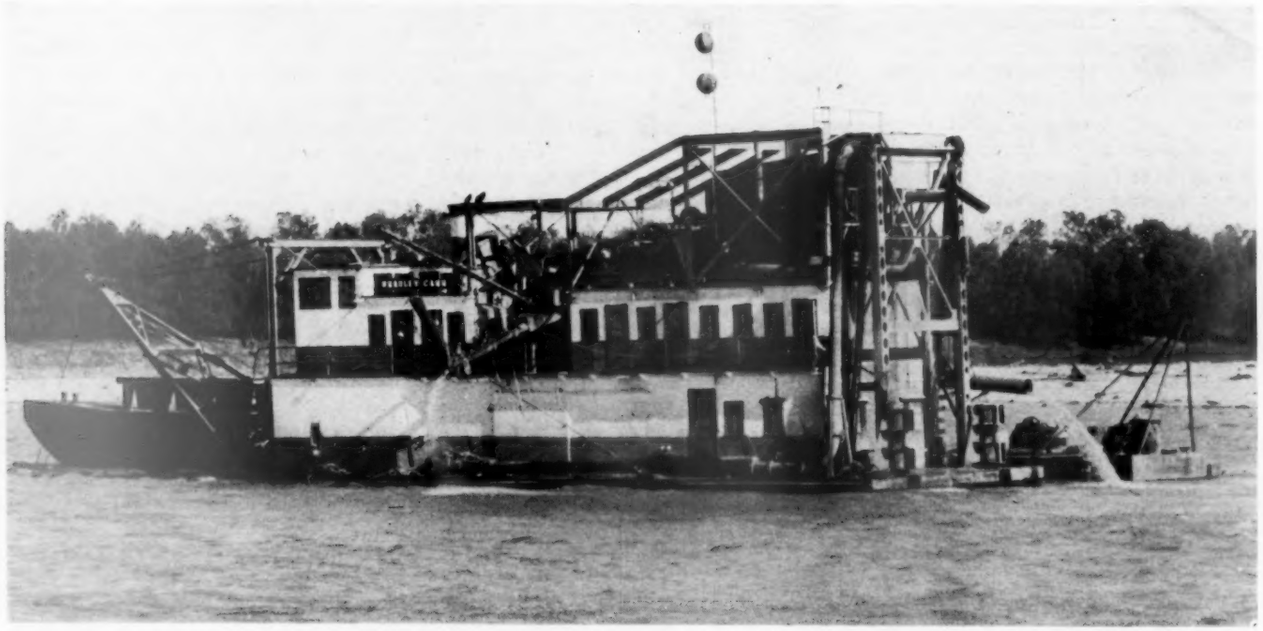
[9] Meissner (H.S.) Journal, American Concrete Institute, April, 1941.

[10] Taylor (William C.), Journal of Research, Bureau of Standards, September, 1938, p. 318.

[11] Report of Committee C-1, A.S.T.M., Annual Meeting, 1941.

Dredge "Bradley Carr" Operating in Mississippi River



The "Bradley Carr," a steel dredge commissioned late last year by the James S. Calmes Construction Company, Baton Rouge, was named in honor of Bradley S. Carr, manager of the pump department of American Manganese Steel Division of The American Brake Shoe & Foundry Company. Mr. Carr has been with Amsco nearly 25 years and is the only member of the Amsco organization to have a dredge named for him. A 12-inch Amsco H.C.F. counterflow pump is direct connected to a 350-horsepower Diesel engine. This particular dredge is in use in Louisiana, digging concrete aggregates in the Mississippi River. It delivers materials to a superstructure screen for separating sand and gravel. Production averages 175 to 200 cubic yards of total materials dug per hour.

By M. L. KUYKENDALL

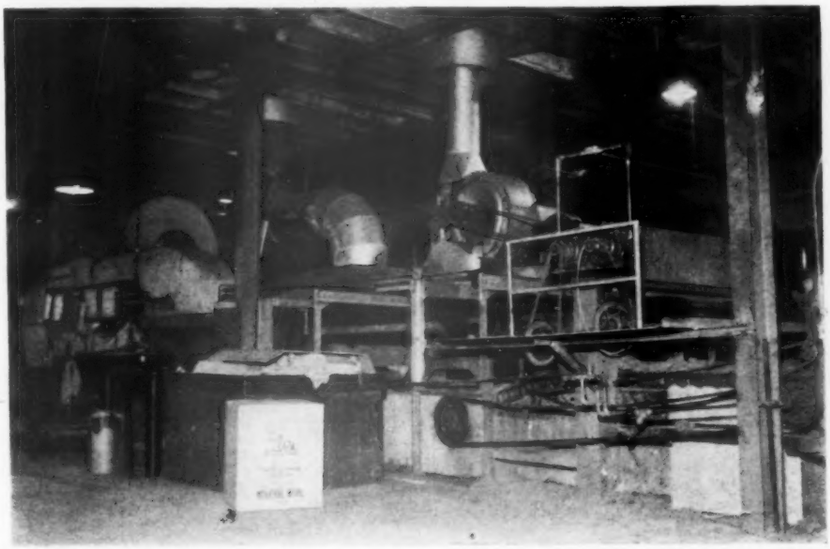
Battery of 6 Cupolas Melts Rock and Slag in Poe Company's Mineral-Wool Plant

ABOVE: Photograph taken with no light other than that produced by the streams of molten material as they leave the cupola and are blown into wool.

THE C. W. Poe Company of Cleveland, an Ohio corporation, was organized in 1923 by C. W. Poe. Mr. Poe was formerly sales manager for the Johns-Manville Company in Cleveland. In 1923 he left that company to become a manufacturers' agent and from 1923 to 1933 he represented the Banner Rock Products Company, and the General Insulating & Manufacturing Company of Alexandria, Indiana, both manufacturers of mineral-wool products. In 1933 the present C. W. Poe Company was organized with C. W. Poe as president, Fred C. Brodie as vice-president in charge of sales, and P. J. Howell as vice-president and comptroller. C. W. Poe has since resigned as president to become chairman of the board. Fred C. Brodie is now president and P. J. Howell, vice-president. These three officers comprise the board of directors.

The manufacture of mineral wool was begun in May of 1933, with one cupola, in rented space in a building located at 2795 East Eight-third Street, Cleveland. The building is on the main line of the Pennsylvania Railroad and has ample trackage for shipping and receiving. Large shipping docks, for shipment by trucks, have been installed. The building, together with three and one-half acres of land, has since been purchased by the C. W. Poe Company and it now occupies the entire available space of 122,000 square feet.

The raw materials used in this plant are a combination of blast-furnace slag and rock, both obtained locally. Most of the coke used is obtained from local coke manufacturers. The raw materials are received in hopper-bottom cars. The railroad siding coming into the plant is elevated and hopper-bottom cars can be dumped in the yard at the rear of the plant. The raw materials are then picked up by a skip-hoist and placed on the charging floor at the rear of the building, directly behind the cupolas. The rock and slag are then charged into the cupola with the amount of coke necessary to melt them, the draft being furnished by mechanical blowers manufactured by the Sturtevant Blower Company. These blowers deliver approximately 43,000 cubic feet of air per minute at one-pound pressure.



A view of the equipment which takes the raw wool and forms it into batts, blankets, etc.

Automatic devices are employed to assure a constant volume and pressure of air to the cupola.

The cupola is tapped from the front, allowing a molten stream about one-half inch in diameter to flow from it. This stream is dropped on divider-plates, which split the stream into four parts. The streams are hit from behind about 12 inches below the notch-holes with a jet of high-pressure steam blown from a specially-constructed nozzle called a blow-cap. The effect of the steam upon the molten stream is to break or sheer the molten material into tiny globules and propel them through the air at high speed. In their flight through the air they are drawn into minute fibres and the result is the common or bulk variety of mineral wool.

There are a great many different types of blow-caps or steam-nozzles in use by the different manufacturers of mineral wool. Most of them, however, are of the conventional V-type with some slight variations. The length and width of the slots and the angle between them is largely a matter of individual preference or practice. This plant uses a conventional V-type nozzle, but somewhat smaller than those in general use. The slots are 1½ inches in length, 3/64 inch in width and come together at a 30-degree angle. The steam pressure at the nozzle is 85 to 90 pounds.

During the process of blowing, a light oil, usually referred to as annealing oil, is applied to the wool as it leaves the blow-cap. The application of the oil prevents the finished material from being dusty or offering any hazard to the workers. The wool is blown into several large settling-chambers, called blow-rooms. These rooms are approximately 50 feet long, about 20 feet high and about 6 to 10 feet wide. In the bottom of some of these rooms is a

One of the six cupolas blowing wool. Some of the others are barely visible in the background.

moving conveyor of the woven-wire type attached to roller chains. The conveyors are driven by Reeves variable-speed drives, powered with 2-horsepower motors, and can be adjusted to travel at speeds varying from 4 inches to 4 feet per minute.

Mineral wool blown into one of these rooms falls in an even blanket on the conveyor and emerges from the blow-chamber at any thickness required, the speed at which the conveyor is operated determining the thickness of the material as it comes from the blow-room. The wool emerges from the blow-room in the form of a huge blanket and passes to a large receiving table, the same width as the blow-room and 15 or 20 feet in length. From the receiving table it can be packed in bags or cut into blankets or batts of various shapes and sizes, as commercial demands may require. Circular saws split the blanket that has been formed into any desired width. Automatic cutting equipment cuts the material into any length required from 8 inches to 8 or 10 feet. Mineral wool fabricated in various forms is supplied to manufacturers of gas and electric ranges, refrigerators, water heaters and many other types of household appliances.

As stated, the C. W. Poe plant started manufacturing in May of 1933 with one cupola. The second cupola was added in 1934 and 4 others were added in subsequent years so that at present 6 are in operation. The blow-rooms of all cupolas are not equipped with conveyors. It is the practice in the operation of two cupolas to blow the wool into large settling rooms which have no conveyors. The material is allowed to settle until the rooms are about half full. The blow-rooms are then opened and the material in them compressed to a thickness of about 2 feet. The material is then cut into blocks of various sizes for specific industrial requirements and placed in a carton usually made to fit the blocks of wool. The material, when opened, can be peeled off the block in any thickness needed for any particular application. This form of industrial wool is known as "bundled wool" and is fully covered by a Poe patent No. 2,067,982. The C. W. Poe Company has developed a great many industrial customers for this product.

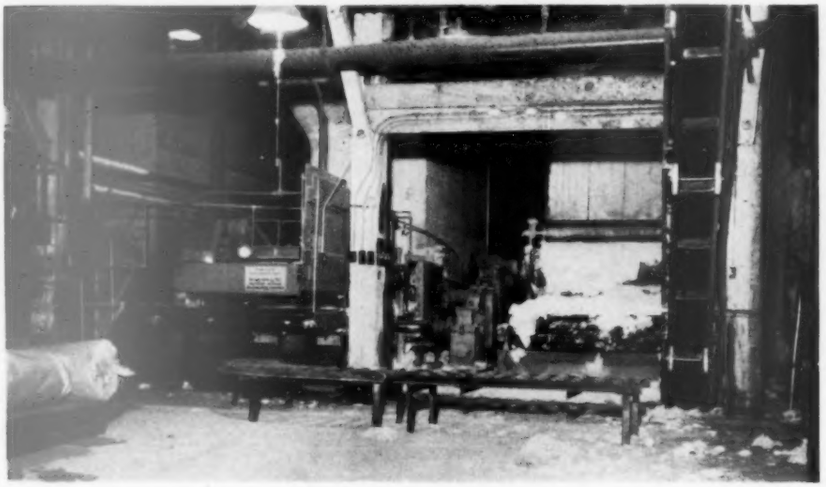
Mineral wool is also fabricated between various types of wire mesh, such as poultry netting, metal lath, hardware cloth, stucco lath and other wire fabrics and is sold for many industrial purposes. These materials, covered on one side with metal lath, are usually plastered or finished with insulating cement. The Poe company manufactures its own insulating cement and it is widely sold and used where a high-temperature cement is required.

Two complete granulators are operated and are used in the manufacture of granulated wool, sometimes referred to as "blowing fiber." This material is sold largely to blowing contractors, who install it in existing buildings by the pneumatic method and is shipped to customers throughout the East and Middle West.

Skip-hoist carrying rock and slag to the charging floor.

In 1939 C. W. Poe and the engineers of his company began experiments to develop an improved type of rock-wool batt. After spending considerable money in building and rebuilding several pieces of equipment, a batt machine was developed to produce a rock-wool batt of from 2 to 5 pounds per cubic foot density which, by the use of different binders, can be adapted to many industrial uses, formerly requiring wire-bound blankets that are much heavier and more expensive. This new product can be compressed in cartons so that twice as many square feet can be packed in the same size carton as formerly, and the batts, when unpacked, will return to their normal thickness. This product has proved so popular among Poe customers that an additional batt machine was installed in June of 1941 and the company can now manufacture about 80,000 square feet of wall-thick batts per day. The batts are furnished in all standard widths and thicknesses, with or without vapor-barriers attached, and in special sizes, shapes and thicknesses.

A unique and unusual feature of the Poe plant is a system of conveyors that



Another view in the plant showing the wool as it emerges from the blow-room.

moves all the finished products from the ends of the blow-rooms to any section of the plant where they are to be stored or processed or to the car-loading doors or truck-loading docks. The conveyor system conserves floor space, eliminates hand-trucks and has effected real savings in time and money.

The Poe company employs about 175 people the year around, not including office workers, salesmen or supervising employees. At the peak season the number will increase to about 200.

The plant is provided with modern showers and locker rooms and drinking fountains and every effort is made to maintain the best of working conditions.

Mr. Poe has personally given a great deal of his time to personnel work and to employee and public relations. Group life-insurance policies and group sickness and accident insurance policies are carried on all the employees. The group sickness and accident insurance also provides benefits for the policyholders' families. The company pays one-half the premium and the employee one-half. Each employee becomes eligible for this insurance after three months' employment. The plan has proved very popular with employees and with very few exceptions they have applied for the insurance as soon as they have become eligible.

The company operates under a closed-shop agreement with the C.I.O.

Weighing out bags of loose wool.

Textile Workers' Union and Mr. Poe states that this plan has been very satisfactory for both management and employees.

The sales volume of the Poe company is about evenly divided between industrial outlets and building-supply dealer outlets. Because of their long acquaintance in the field, Mr. Brodie and Mr. Poe personally handle a large volume of the industrial sales. The company's products are shipped to all parts of the United States. The territory east of the Mississippi is covered regularly by

(Continued on page 49)

Circular saws splitting the wool blanket into batts of the desired sizes.

Granulated wool is also weighed into bags for shipment.

Conveyor which carries the bags to freight cars for shipment.

CALICHE: Its Mining and Uses

By J. A. RICKARD

Department of History
Texas College of Arts and Industries

IN many parts of the southwestern United States good building sand and gravel are very scarce and stone suitable for highway construction is hard to get. Sometimes such materials have to be shipped as far as four hundred miles. However, a native product called *caliche* is being widely used as a substitute.

This substance is a sedimentary lime containing more or less clay, or a clay deposit containing more or less lime. In some *caliche* there are large amounts of sand and small quantities of magnesium and iron also. It forms the subsoil in much of the southwestern United States. In some places it crops out on the top of the ground, and in others it is found beneath a top soil that varies in thickness from a few inches to 5 or 6 feet. The *caliche* deposits themselves are found in spots, some of which cover hundreds of acres of land and may be as much as 20 feet thick.

The most common use for this material is in constructing highways. It makes such an excellent flexible base or relatively stable sub-base that highway engineers often specify its use, even when stone and gravel are available.

So extensively is *caliche* used that construction companies getting contracts from the Texas State Highway Department to build roads often lease and operate county-owned or privately-owned pits located near their jobs.

To illustrate the growth of the *caliche* pit industry, perhaps it would be well to take a single county. Kleberg County is in South Texas. In it are five privately-owned pits and two county-owned ones. One of the latter the county operates itself, and the other is leased to a construction company.

In the privately-owned pits the purchaser pays 25 cents per cubic yard and digs and hauls the *caliche* himself. Most of this material is purchased by truck men, who deliver the product to consumers at $1.00 to $1.25 per cubic yard. It is used to surface driveways or farm roads, to fill in around culverts, to fill mud holes, etc.

The county-operated pit has been in use only a few years, but from it an estimated 40,000 cubic yards of *caliche* has already been removed. In this pit the mining process is fairly simple. A McCormick-Deering tractor is hitched to an Adams leaning-wheel road grader, which piles up the *caliche* in loose windrows. Men with shovels then load it into dump trucks, which carry it to the road job. The county keeps a topping of *caliche* on all its unpaved roads and thus makes them usable in muddy weather.

Section of state highway in Texas showing caliche crown beside pavement.

A portion of the Kleberg County pit.

Caliche block in dormitory wall at Texas College of Arts and Industries.

Uncrushed caliche in the pit.

In the other county-owned pit the leasing construction company has a new S-50 Speeder shovel that loads the trucks direct from the pit. If a secondary road is being built or repaired, the material is carried direct to the place where it is to be used. If a paved road is being constructed, the *caliche* is put through a Pioneer crusher, which is in the pit.

In that machine the large stones are crushed until all of the material will pass through a 2-inch screen, and from 50 to 85 per cent. of it must be retained on a 40-mesh sieve. This means that the *caliche* must have a relatively low binder content, with a low linear shrinkage.

After this material has been crushed it is deposited in a large hopper, under which the truck drives and receives its load. The product is then taken to the scene of the highway construction.

The thickness of the *caliche* highway base varies from 6 to 12 inches, depending on the stability of the sub-grade. As good drainage is necessary for the proper behavior of this material, the bases are usually constructed to a full crown width when placed in a relatively impervious sub-grade material. It is then sealed by applying a base preservative or waterproof surfacing.

Traffic is used to compact and bind the base course before the highway is completed, the amount and nature of that traffic being controlled by the engineer in charge.

A start has been made also in the use of *caliche* to make blocks and to build houses. One notable step in this direction has been the building of a dormitory which houses thirty-two boys at the Texas College of Arts and Industries. It is an N.Y.A. project.

Before the work was started the engineering department of the college made experiments to test the compressive strength of the material. Using a mixture of 6 parts of finely-crushed *caliche* to 1 part of cement, the engineers tested four samples. They showed compressive strengths ranging from 734 to 775 p.s.i. This is a safe margin above the A.S.T.M. requirements of 700 p.s.i. of gross area.

The blocks made from this mixture varied in size, but in the main they were 6- by 12- by 18-inch. However, some blocks were 6- by 6- by 12-inch, and no doubt they could be made much smaller. They were made by hand in wooden forms and were allowed to set three days before being used. The mortar was a mixture of the same material as that of which the

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Shovel loading one of the trucks on the quarry floor. Mine entrance in background.

Kentucky Quarry Operator Adopts Power-Cable Method to Move Trucks Up Incline

Truck coming up the incline. Note the cable.

THE Cedar Bluff Quarry at Princeton, Kentucky was recently confronted with a haulage problem which was solved by the installation of a very interesting haulage system. This company, which has been owned and operated by W. C. Sparks since 1926, had been working its quarry at the 60-foot level until the overburden got too heavy. Three years ago work was begun on lowering the quarry floor another 100 feet and two years ago a mine was developed at this level. Now all the hard limestone for crushed stone is obtained from the mine and another 40-foot level has been opened in the quarry for soft agricultural limestone.

With the quarry floor 200 feet below the crusher level the problem of hauling stone to the plant became a serious one. Cars were originally used in both the mine and quarry. Later trucks hauled stone from both the mine and the more remote sections of the quarry and dumped their loads into 1½-cubic yard quarry cars which could also be loaded direct. These cars were then hauled to the foot of the incline by gasoline locomotives and were hauled three at a time to the plant by a hoist and cable.

Close-up view of an ascending truck.

This view shows the barney car behind a truck.

In looking about for a better haulage system Mr. Sparks became interested in the system used by the New York Trap Rock Corporation at its Verplanck, New York quarry, which was described in the October, 1939 issue of PIT AND QUARRY. He adapted this system to his own needs and had it in operation on

(Continued on page 49)

Portable Plants Furnish Materials for Indiantown Gap Cantonment

THE Indiantown Gap Military Reservation near Harrisburg, Pennsylvania is one of many army training camps which have been largely responsible for a sharp increase in the demand for crushed stone. This reservation of 2,600 acres was formerly a National Guard camp but now has facilities for housing and training 22,500 men. Construction of the buildings and roadways was begun in October, 1940 and was completed in May, 1941. All the buildings are of wood with concrete foundations. The crushed stone used in this concrete and for the roads within the reservation was supplied by a portable plant operated by a company specializing in this work. The concrete was supplied by truck-mixers from a temporary batching plant.

The work now in progress consists of paving the access roads to the reservation and all the state highways running through it. This work is being done by the W.P.A. as Project Number 07509-38 and the roads involved are Sections 38,001, 38,003 and 38,023 of State Route 141 in Lebanon County. This project involves 6.8 miles of blacktop road which was 18 feet wide with a 5-foot shoulder on each side. This is being converted into a 44-foot pavement with 10-foot shoulders, except for 1¼ miles which will be 33 feet wide with 10-foot shoulders. A 10-inch crushed-stone base is being laid in two layers which are rolled separately. The original plan was to add to the existing roads but it was found that traffic would be so heavy that reinforcing was necessary. The old pavements are therefore being scarified and 4 to 6 inches of stone is being added before they are resurfaced. The project also involves the widening of nine bridges. Two are box culverts, one is a 72-inch pipe culvert and the others are arch bridges with spans of from 12 to 26 feet.

The original intention was to collect stone from a mountainside and crush it, but this plan was found to be too costly and two adjacent quarries were opened. The equipment for a crushing plant was borrowed from the state and this went into operation early in February. Later two additional plants were borrowed and erected at this location. All these plants are identical in their design and equipment.

The deposit is a seamy but very hard trap rock which is very difficult to drill. Wagon-drills and 40-per cent. gelatine dynamite are used to break up the rock and a 1¼-cubic yard Lima gasoline shovel rips down the bank. This shovel is also used for loading from stock-piles and was used to remove the overburden which was 6 feet deep where the quarry was opened but is tapering down grad-

One of the three plants. A detachable-bucket truck is discharging a load of stone.

Workers filling buckets in one of the quarries.

Truck being loaded with stone from stock-pile.

ually. Any stone over 1-man size is broken with sledge-hammers.

The stone is loaded by hand into the 2-cubic yard buckets of three Dempster Dumpsters which are mounted on 1941 International truck chassis. Each Dumpster has five buckets, each of which is loaded by four men. Each Dumpster handles an average of 20

One of the units discharging stone to crusher.

cubic yards of rock per hour. Usually two of the three plants are operated and each produces from 300 to 350 tons of crushed stone daily.

At each plant the stone is discharged into a 12- by 26-inch Good Roads Number 6 Champion jaw crusher which has a rated capacity of 50 tons per hour and reduces the material to 3-inch size

Jaw-crusher being driven by 75-horsepower engine.

and under. A belt-bucket elevator feeds this stone to a 36-inch by 20-foot Good Roads revolving screen provided with 1¼-inch round perforations. The two sizes of stone from this screen go to separate bin compartments. The fine stone is ued for stabilizing shoulders and the coarse stone is the road rock or ballast. The stone is delivered in rented trucks and is placed by W.P.A. crews using spreader boxes.

Each plant is operated by a 75-horsepower Waukesha gasoline engine which drives the crusher through V-belts. The elevator and the screen are driven from the crusher. Cleveland and Ingersoll-Rand wagon-drills are used and air is supplied by Chicago Pneumatic and Schramm portable gasoline compressors.

C. W. Poe *(from page 45)*

Poe salesmen. A considerable volume of the material sold to building-material dealers and lumber dealers throughout the territory is manufactured by the Poe company for such national brand accounts as the Flintkote Company, the Barrett Company, and the Keasbey-Mattison Company.

Kenneth Willis has been in charge of the plant and all manufacturing operations for some years. He has developed a plan of holding classes or schools for foremen and all supervising employees and this plan has contributed much toward the efficiency and safety of the employees. Safety and accident prevention has long been one of Mr. Willis' interests and he has taken every precaution and adopted every safety device in his efforts to keep lost-time accidents at the minimum. Mr. Willis and the Poe company, through his efforts, have maintained a very impressive safety record.

Mr. Poe has long been active in the affairs of the industry and his company is a charter member of the National Mineral Wool Association. He has served as its president. When he is not busy with the affairs of the Poe company or the mineral-wool association, he spends his time at his farm and country home.

Cedar Bluff *(from page 47)*

February 10, 1941. Five new Ford trucks with 1½-ton heavy-duty bodies are used. These trucks have 95-horsepower V8 motors, extra-heavy springs and frame, dual rear wheels and haul 6 to 6½ ton loads. They are loaded in the mine and quarry by two Bucyrus-Erie 20-B electric shovels with ¾-cubic yard dippers. The trucks from the mine level run down an incline to the quarry floor 40 feet below. At the bottom of the main incline to the plant the trucks straddle a cable and a barney car engages a special plate on the rear end of the truck frame. The same 85-horsepower electric hoist formerly used for cars hauls a loaded truck up this incline at the rate of 10 miles per hour. The incline is about 600 feet long and has a grade of 22 per cent. for most of its length. The trucks are left out of gear until near the top of the incline where the gradient lessens and are then run under their own power a few hundred feet to the crusher. The barney car returns to the foot of the incline by gravity and the empty trucks return to the quarry with their compression acting as brakes in the third of eight forward gears. The capacity of this system is about 150 tons per hour, more than enough to keep the plant operating at full capacity. According to Mr. Sparks this system is much more efficient and economical than the one it replaced.

The system will be improved by the pouring of 3-foot concrete strips on each side of the cable for the trucks to run on. A pit for the barney car will also be dug in the quarry floor.

Mica Supplies Being Maintained in U. S.

Nothwithstanding the high rate of consumption in 1940, private industry stocks of mica were well-maintained in most categories and the total was higher on December 31 than at midyear, the Bureau of Mines reports. Purchases for government stock piling, however, were largely postponed to avoid interference with the flow of supplies through regular channels. Owing to greater production of block mica in Brazil (and to a smaller extent in other countries) and the diversion to the United States of much of the mica that normally would flow to continental Europe, supplies of muscovite are expected to keep pace with increased consumption; but even before the end of 1940 the situation with respect to amber mica, both block and splittings, began to cause uneasiness. Even before the fall of France deliveries from Madagascar had not been satisfactory, and when Madagascar declared for the Vichy government the British blockade delayed procurement of shipping space even for shipments of this highly important material to the United States, and increased production in Canada failed to relieve the situation completely. Moreover, some of the Canadian amber mica could not be used in making nose washers for airplane spark plugs, and supplies of suitable mica for this purpose were more and more depleted.

A favorable development during the year was the announcement that satisfactory spark plugs for airplanes and other important military equipment could be made by using ceramic cores containing no mica. Such plugs are being made already by several domestic manufacturers. Although large quantities of mica plugs are still being manufactured for United States as well as British government use, the situation with respect to mica requirements for this purpose has definitely improved.

By W. H. TAYLOR

Land-Pebble Phosphate Deposits of Florida—II

LAND-pebble phosphate in Florida was first found in Peace River bed in Polk County near Bartow. Considerable prospecting was done up and down this stream, and a sufficient quantity and grade of material located to warrant the expense of organizing a pioneer mining company, which began operations some time during the year of 1891. Less than 500,000 tons of phosphate was produced in the United States that year, and a very small portion of this came from Florida.

The first dredges were both crude and small. They were equipped with small wood-fired boilers, which furnished steam for engines, which in return drove clumsy slow-speed centrifugal pumps. The power was limited and transmitted by belts and pulleys. The loose pebbles in the river bed were pumped up into a small washing plant built on board the dredges. After washing the pebbles were discharged to small barges, which were hitched to, and towed along with, the dredges. When the barges became loaded they were towed to shore, and the pebbles discharged by hand into wagons and hauled by horses to the drying plants.

In those pioneer days the only fuel obtainable was wood, which was bountiful and cheap. The drying plants were very crude and simple, and consisted of several hundred wagon-loads of wood covered with boards, on top of which the phosphate rock was piled by hand. The wood was set afire, and when burned out the rock was dried sufficiently so that it could be loaded into box cars by hand with wheelbarrows pushed up the inclines. A considerable amount of charcoal and ashes went along with the phosphate, but this was not considered a particularly objectionable feature at that time.

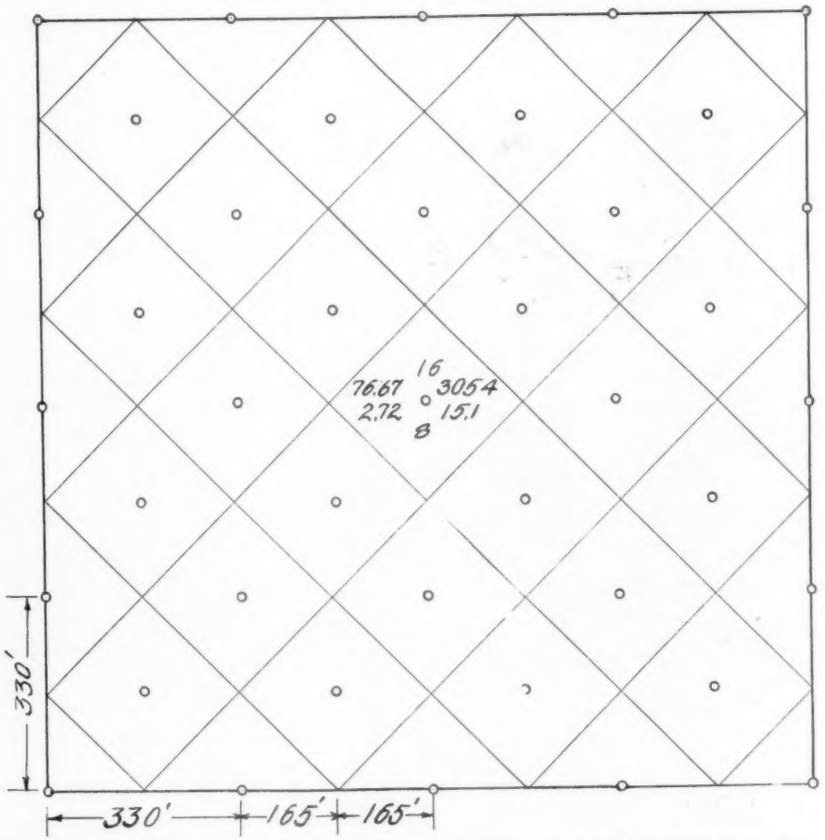
Labor, as well as fuel, was plentiful and cheap, which made it possible to produce such small amounts at a profit. As soon as these conditions changed, producers were forced to change their methods rapidly in order to stay in business.

After Peace River dredging had been in operation for a short time, it was discovered by putting down surface wells for water that the adjacent lands surrounding this territory were underlaid with a deposit of the same material. This fact immediately stimulated an intensive prospecting program, which is still being pursued, and has developed to date some 300,000,000 tons, in addition to what has already been mined during the past fifty years.

At this stage of development Peace River bed dredging began to dwindle, and operations were shifted to high land. Because labor was so cheap and plentiful, the shallow overburden was first removed by hand with wheelbarrows, and later with horse-drawn scrapers. The dredges were shifted to these pits and the pump suctions were equipped with cutters. This method immediately increased production to the extent that more elaborate plans were laid for future mining, which led to the beginning of the hydraulic methods at present employed.

What now are considered minable land-pebble phosphate deposits lie more or less in pockets scattered throughout the area of some half-million acres on the west gulf coast of Florida. Preliminary inspections are made by experienced persons who are thoroughly familiar with every peculiarity of the deposits. If sufficient evidence is found, one or two test holes may be put down on each 40 acres after a survey has been made. If this proves encouraging, a complete survey is made and each 40 acres is laid off in 16 equal parts, and the same number of prospecting holes are put down. Each hole in this case represents 2½ acres, and the amount of pebble found in each hole is multiplied by 2½ in order to compute the number of tons per acre.

On those "forties" in which the tonnages and grades prove to be high enough to warrant a profitable mining proposition a re-survey is made after 16 holes on each one have been completed and 16 additional holes are put down, which makes a total of 32, or one hole to each 1¼ acres. With few exceptions this is considered thorough enough for mining operations, and



Method of surveying each 40 acres for complete prospecting. Each of the 32 holes represents 1¼ acres. Complete results are indicated in center tract. The figure "16" represents depth of overburden; 76.67, grade; 3054, tons per acre; 2.72, percentage of iron and alumina; 15.1, percentage of pebble in matrix; 8, depth of matrix.

Electric drag-line with 150-foot boom handling both overburden and matrix.

blue-prints containing such information are carefully followed.

On account of the shallow deposits and softness of the material, land-pebble phosphate prospecting is, in nearly all cases, done by hand. Three men compose a crew, and generally one foreman runs several crews parallel with each other. A4-inch blade auger is used with short sections of ¾-inch pipe, which are added as needed. The auger is operated inside a 4-inch pipe, which is kept pushed down ahead of it, in order to prevent caving.

The matrix obtained from each hole is weighed, after which the pebbles are washed out on a screen with .028-inch openings. The plus material, or that which is retained on the screen, is dried and weighed, after which the tons per acre are computed, and a chemical analysis is made. The formula used for calculating tonnages is as follows:

$$\text{Tons per acre} = \frac{\text{lb. per cu. ft.} \times 43{,}560 \times \text{depth} \times \%}{2{,}240}$$

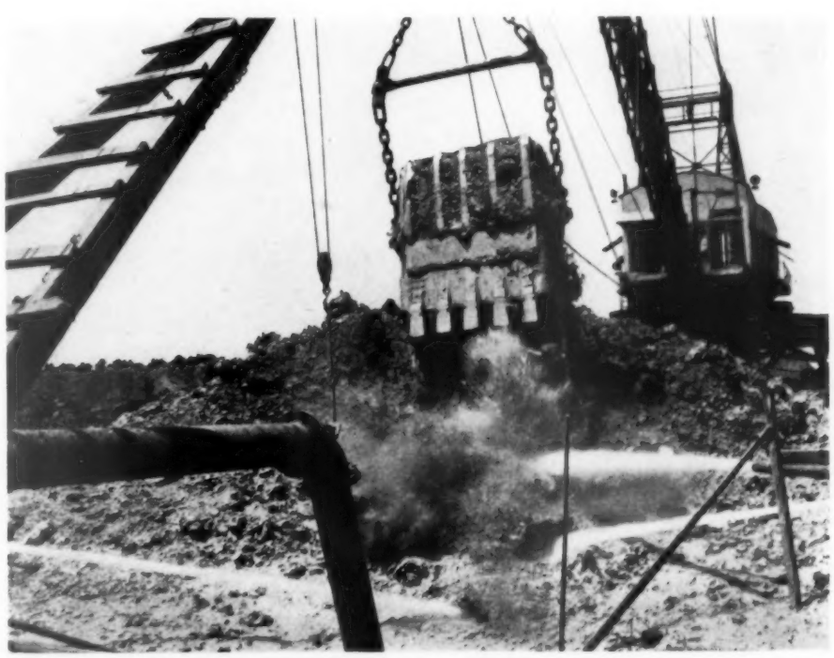
The above is considered to be what an efficient washing plant can do if equipped with the same size screen openings as used in prospecting. The minus material, or that which passes through the screen, is deslimed and put through a flotation-cell test to determine the amount of fines which can be recovered from the washer *débris*, which is usually at least 50 per cent. of the coarser material.

In the old days before the flotation method were perfected any prospecting hole showing less than 1,000 tons per acre of high-grade phosphate rock was not considered minable. Since that time these low-tonnage holes have been re-prospected on a flotation basis, and the potential possibilities of the district have been doubled. In some cases holes showing as little as 500 tons of pebble have been re-prospected on a flotation basis, and an additional 5,000 tons per acre developed.

The Florida land-pebble phosphate deposits are particularly well suited to the application of mass-production methods. The output per man-hour has increased more than twenty-fold since 1891. This has been made possible by the maximum use of large-capacity equipment. In recent years the eight companies operating in the land-pebble fields produced 80 per cent. of the total phosphate rock mined in the United States. The recorded increase in productivity is the result of the increased application of mechanical power combined with more efficient methods of procedure.

Around 85 per cent. of the industry's output is sold to fertilizer manufacturers who treat it with sulphuric acid or process it in some other manner to change its phosphorous content into forms suitable for plant food. The remainder is sold to chemical manufacturers who prepare materials for making a variety of commodities, including baking powder, matches, cleaning and water-softening compounds, silk-weighting and rust-proofing materials, and a number of phosphorous compounds used in industry, warfare and medicine. Phosphate is of considerable general interest because it is a raw material that is vital to the nation both in peace and in war. In wartime phosphate rock is an essential raw material for the manufacture of certain types of shells and signals, as well as incendiary and smoke bombs.

Metallic phosphorous, which is obtained by reducing sintered matrix or pebbles in blast-furnaces, oxidizes so rapidly when exposed to the atmosphere that it burns with intense heat and is extremely difficult to control after blazing. The most common method of manufacturing phosphoric acid is by condensing the oxidized fumes of burning metallic phosphorous. Phosphorous burns are both painful and hard to heal, and the continued breathing of the fumes by workers sometimes causes bone decay. Both these products create serious occupational hazards unless the operations are properly controlled. The smoke created from burning phosphorous is very dense, and affords an excellent screen for concealing secret movements in warfare, etc.



Here the drag-line is digging matrix from bottom of cut and piling it where hydraulic monitors sluice it to the pump. It is then carried by pipe-line to the washer half a mile away.

The gradual development and increase of efficiency in overburden removal, from wheelbarrows and horse-drawn scrapers in 1891 to 10-cubic yard drag-lines in 1941, has decreased the cost from possibly as high as 50 cents to less than 2 cents per cubic yard. This has been accomplished in spite of the fact that the costs of both labor and supplies have increased steadily. A large electric drag-line in Florida land-pebble mines today will remove about 10 cubic yards of overburden every 40 or 50 seconds of actual operating time. This is from four to six times the work accomplished with the steam shovels and drag-lines of twenty-five years ago. No supplementary haulage is necessary because electric drag-lines usually dump the overburden into a parallel cut, from which the matrix has been mined. Only three men are required per shift to operate one of these large machines, compared with 30 or 40 men required in operations of comparable size using steam shovels and locomotive haulage, and about 5 or 6 men per shift required to operate and maintain the steam drag-lines of 1920.

Comparable hydraulic operations today usually require more labor and power, and less capital. The greater consumption of labor in hydraulicking the overburden is due largely to the work involved in maintaining and moving pipe-lines and other hydraulicking equipment, as well as the costly maintenance of waste dumps which require large crews of men to keep them up. The greater power costs are due largely to the fact that about 5 or 6 cubic yards of water must be handled for every cubic yard of overburden. A large portion of the overburden was so hard that it was necessary to blast it with tons of dynamite before it could be hydraulicked, which not only increased the unit cost but also greatly increased the accident hazard.

In addition to having greater capacities and requiring less operating labor than earlier machines, modern drag-lines are moved and maintained with such ease that only about 8 to 12 per cent. of the total operating time is lost in moving and other delays. Machines of the older type were said to have lost at least twice as much time. Because of their great mobility and power, drag-lines are often used to assist in moving the heaviest mining equipment from one location to another as mining progresses. They are also used in some cases to loosen the matrix bed to facilitate the hydraulicking operations that follow. At the present time several mines are piling the matrix on the top of the ground surface and hydraulicking it to the washing plants at a considerable saving in power and labor. Although the labor and power savings can not be measured accurately, it is apparent that the amount is substantial and that drag-lines should be ranked as one of the most important of recent improvements employed in the industry.

Caliche (*from page 46*)

blocks were made, but it was mixed in the proportions of 1 to 3. The foundation and the floors of the building were also made from the *caliche* mixture.

The building is a natural gray color, but coloring material was put into the floors. The porches and sidewalks—also of *caliche*—have been painted. They take paint well, but the paint does not stay on very long.

A number of architects and engineers have examined the building, and interest in this type of construction is growing. The dormitory was erected three years ago and seems as substantial as it was the day it was completed. Several dwellings of *caliche* blocks have been erected in the vicinity.

Removing the material by hand from windrows.

Steam shovel loading a truck with caliche.

Dumping the load at the crusher.

Crushed caliche which passed a 2-inch mesh.

It would be interesting to see what modern machinery would accomplish in working with this material. For instance, would a Dunbrik machine make acceptable bricks with it? Will it displace sand and gravel to any great extent? Would *caliche* concrete-block making be a profitable business venture? No doubt such questions will be answered in time.

Home Builders Feeling Effect of Shortages

With the demand for new residences steadily rising and restrictions on some building materials already in effect, the building industry faces an immediate challenge to adjust itself to emergency conditions if the high volume of house construction is to be maintained. The adoption of simple designs, new types of materials and new building methods, as well as further concentration on low priced houses, is required.

That is the opinion of federal analysts as summarized in the August issue of the *Federal Home Loan Bank Review*, which discusses the effects of the defense program on prospects for residential construction.

"The job before all elements of the building industry is stupendous and will require a great deal of planning and coöperation in addition to radical changes in local building codes, labor practices, and construction standards set by home-mortgage lenders," says the *Review*. "In the end, however, the success of these adjustments will depend upon the consumers' acceptance of new standards which, although forced by the emergency, may in many instances involve no impairment in the utility of homes.

"All signs point toward further expansion of home building. A rapid increase in the marriage rate, rising employment and incomes, and resumed population movements from farm to city create housing demands of the first order, and for the country as a whole, any possible unfavorable effects of emigration from non-defense areas are more than offset by the concentrated needs in defense localities.

PERSONAL MENTION

HUGH O. MELOY has been appointed superintendent of the Standard Portland Cement Company, Painesville, Ohio. He has been continuously employed by the company since his graduation from Purdue University in 1927. Mr. Meloy is 37 years old and a native of Sellarsville, Indiana.

FRED BURGGRAF has been appointed assistant director of the Highway Research Board of the National Research Council. He has been connected with research relating to highways since 1919, his career including connections with the National Bureau of Standards, the Illinois Division of Highways, the Calcium Chloride Association, and the Highway Research Board.

E. J. AUSTIN, of Owatonna, Minnesota has sold his gravel pit to G. C. KOHLMIER.

E. B. CAPE has been appointed district engineer for the territory comprising Texas, Oklahoma and Arkansas, with offices in Austin, by the Asphalt Institute.

HAROLD G. SMITH, former chief engineer of the Automotive Division of the Buda Company at Harvey, Illinois, has been promoted to executive engineer in charge of all engineering of automotive, marine, industrial and radial Diesel engines.

GORDON LEFEBVRE, former American Locomotive Company executive, has been elected vice-president and general manager of the Cooper-Bessemer Corporation.

JAY L. HENCH, vice-president of the Hillside Fluorspar Mines, Rosiclare, Illinois, has been elected president and treasurer to succeed the late George H. Jones.

GEORGE IVERSON, foreman of the Buford gravel pit near Cheyenne, Wyoming, for the Union Pacific Railroad for a number of years, was fatally injured recently near Humphrey, Nebraska, when the motor car on which he was riding was derailed at a crossing.

FRED L. CHRYSLER, 67, president and general manager of the Casey Lime & Stone Company died suddenly at his home in Casey, Illinois of a heart attack. He had been engaged in the hardware business in Casey for more than a quarter century and had headed the stone company for six or seven years. The widow and one daughter survive.

FRANK KEENER, 70, former manager of the Western Indiana Gravel Company, died recently at his home in Anderson, Indiana.

OWEN P. THOMAS, 58, president of the Mettowee Valley Slate Company, Granville, New York, died September 10 at his home in Brooklyn.

CHARLES H. ROBERTS, 51, treasurer of Johns-Manville Corporation, died September 10 in New York City of a heart ailment.

Chas. L. Hogan

CHARLES L. HOGAN, 60, president and general manager of the Lone Star Cement Corporation, New York, died September 5 at a hospital in New Rochelle, New York. His residence was in Mount Vernon. Born at Tippecanoe, Ohio, Mr. Hogan was taken as a boy to Kansas City, where he attended the public schools. He started his business career as a railroad employee.

The Sure Sign of a

Satisfied Customer

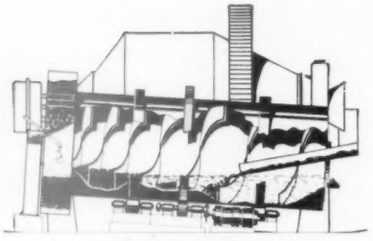
J. C. O'Connor & Sons, Inc., Peru, Indiana, large sand and gravel plant operators, bought their first Deister PLAT-O Vibrating Screen in 1936 . . . since then, have added—one at a time—3 more PLAT-O Screens to their operation. When customers like this one order and re-order, it's a sure sign that they're satisfied . . . that they're getting faster and more economical sizing with Deister PLAT-O Vibrating Screens. PLAT-O's powerful positive high speed vibrating mechanism is your assurance of accurate, fast grading. Automatic screen cloth tension, oil lubrication, simple rugged construction, fully cushioned vibration . . . your assurance of greater dependability and minimum maintenance costs. Be sure the vibrating screen you buy offers these advantages . . . be sure it's a PLAT-O.

Top: View of the O'Connor plant at Peru. Supt. Ray Tucker says, "These Deister Screens are very dependable . . . give mighty good service and do the work in nice shape. Maintenance expense is low compared with other screens."

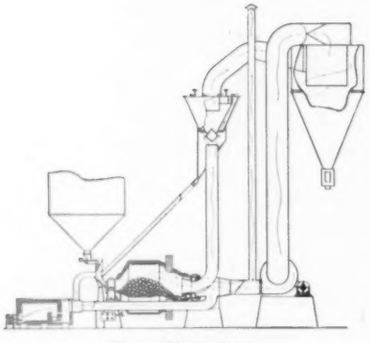
DEISTER MACHINE COMPANY • FORT WAYNE, INDIANA

HARDINGE MILLS
in the
DEFENSE INDUSTRIES
are grinding—

Aluminum
Carbide
Carbon
Chemicals
Chrome
Coke
Copper
Carborundum
Lead
Iron
Magnesium
Manganese
Molybdenum
Tin
Tungsten
Zinc



Wet Grinding



Dry Grinding

HARDINGE
COMPANY, INCORPORATED
YORK, PA., Main Office & Works
NEW YORK, 122 East 42nd Street
CHICAGO, 205 W. Wacker Drive
SAN FRANCISCO, 501 Howard St.
TORONTO, 159 Bay Street

He later entered the cement business as traffic manager for the Lumbermen's Portland Cement Company, subsequently becoming secretary and sales manager. In 1914 he became president and manager of the Altoona (Kansas) Cement Company, with which he remained until 1921, when he was made manager of the Cuban Portland Cement Company at Havana, a subsidiary of the Lone Star Cement Corporation. In 1924 he became vice president and manager of another Lone Star subsidiary, Knickerbocker Portland Cement Corporation, at Albany. He was made vice president of Lone Star in 1926 and president and general manager in 1931.

C. M. VANDERFORD, 63, president of the Arizona Concrete Company and the Shumway Materials & Supply Company, both of Phoenix, died at Redondo Beach, California a short time ago.

CHARLES A. LUND, 39, president of the John R. Sand & Gravel Company of Detroit, died recently following injuries sustained in an automobile accident.

AMOS H. POTTS, 61, for many years district engineer for the Portland Cement Association at Los Angeles, died recently following a heart attack suffered while at his desk. He was a native of England but came to the United States with his parents in his youth, settling in Los Angeles where he had spent practically his entire life.

HOWARD BROOKE, 73, founder and retired president of the Bergen Building Block Company, manufacturer of cinder-concrete blocks at Ridgefield Park, New Jersey, died July 11.

FOREIGN PRACTICE

Special Cements in Laboratory and in Use

Otto Graf and Kurt Walz report on the testing in the laboratory and in the field of seven street-paving cements having high flexural strength and comparatively low shrinkage. Some of these cements had a comparatively high percentage of iron oxide. The field tests were started late in 1938 on a section of the German national automobile road near Hannover. The problem to be answered is as follows: Are cements with higher content of iron oxide more suitable than the customary paving cements with lower content of iron oxide? At least four more years of field testing must be awaited before it is possible to obtain further insight into the behavior of the street test section. The iron-oxide (Fe_2O_3) content of the cements under test ranges from 2.01 in one to as high as 7.00 per cent. in another.—*Zement*, vol. 30, no. 12 (March 20, 1941), pp. 153-158; no. 13, pp. 164-176; no. 14, pp. 181-186; no. 15, pp. 205-210; no. 17, pp. 219-225.

Behavior of Slags in Lime Solution

R. Rodt investigates the behavior of blast-furnace slags in reference to a saturated solution of hydrate of lime, using in his principal tests four blast-furnace slags which had the following chemical analyses:

	I	II	III	IV
Silicic acid	33.9	36.9	41.1	39.2
Alumina	10.9	15.7	17.3	18.1
Iron oxydul (FeO)	0.4	1.3	1.2	0.4
Manganese oxydul (MnO)	2.2	0.2	0.6	0.6
Lime (CaO)	34.8	31.7	32.4	38.8
Magnesia (MgO)	10.4	8.0	3.4	4.1
Calcium sulphide (CaS)	3.4	5.8	2.5	3.9
Gypsum ($CaSO_4$)	0.3	0.4	0.2	0.07
Degree of acidity: $\frac{CaO+MgO+\frac{1}{3}Al_2O_3}{SiO_2+\frac{2}{3}Al_2O_3}$	1.19	0.95	0.79	1.16

These cements were prepared into specimens, some having 7 per cent. and others having 25 per cent. of clinker, with additions of 3 per cent. of gypsum. The clinker had the following chemical composition: 19.6 per cent. silicic acid; 8.8 alumina; 3.1 iron oxide; 0.3 manganese oxydul; 63.6 lime; 2.6 magnesia; 1.9 gypsum (water-free); 0.1 calcium sulphide. All the slags were screened and the particles between 2,500 and 4,000-mesh sieves were used. Saturated lime water was added in various proportions to distilled water in test tubes and the mixture was moved hourly for various periods of from 1 to 28 days. Following the test the remaining lime, and also the lime in the hydrate-of-lime solution, besides its volume, were determined. The author summarizes his work as follows:

"In the action of saturated lime water upon the granulated blast-furnace slags, the slags bind only a comparatively small quantity of lime but also non-granulated non-hardening crystalline blast-furnace slag binds lime, even though in still much smaller quantities. Moreover, the lime-binding capacity of the granulated blast-furnace slags stands in no law-conforming connection whatsoever with its hardening capacity. This verifies the conception that the lime hydrate is only an exciting agent in the slag hardening and points also further to this, that the blast-furnace slags are to be evaluated not as hydraulic additive but as independent hardening agents.

"In the action of lime water upon the slags there sets in also a very strong increase in volume of the slag powder in the lime-water solution, which can be traced back to a 'swelling' of the slag

particles. This swelling capacity of the slags runs the same as their hardening capacity, but it increases more strongly than the hardening capacity. Also the crystalline non-hardening blast-furnace slag shows a low swelling capacity.

"The conclusion is drawn from this that the hardening of the blast-furnace slags rests essentially upon physical procedures, in which the swelling procedure is also to be included."—*Zement*, vol. 30, no. 19 (May 8, 1941), pp. 247-250; no. 20, pp. 259-263.

Heat Requirements in Cement Burning

H. Zur Strassen states that when in a technical heat investigation of the rotary-kiln process the heat of reaction of the clinker burn had to be determined, it was found that the customary method of calculation is too cumbersome and can be displaced by a much simpler method. Starting from the old method, he develops a new one and applies it in the calculation of the formation of a clinker from limestone and alumina and also from limestone and slag. He discusses the ideal burning process, the course of isothermic reaction, critical discussion of the accuracy of the results, and heat toning of the production of clinker from limestone and blast-furnace slag.—*Zement*, vol. 30, no. 18 (May 1, 1941), pp. 231-234; no. 19, pp. 250-252.

Kneading Machine for Determining Set

S. Stein describes a kneading machine which he had made for use in a cement-works laboratory in which freshly-ground cement and also cement ready for shipment have to be tested hourly as to setting time, and in which cement has to be tested similarly often on the demand of customers. The German cement standards require that 300 grams of cement and water of 17 to 20 degrees C. is stirred and kneaded for 3 minutes suitably in a pan by use of a spoon, giving a stiff mixture. The manual work done in the test procedure can lead to undesirable discrepancies in the test results. A kneading machine was constructed, therefore, to replace the manual work.

This machine consists essentially of a round bowl, and also of a pair of suitably driven rolls which are mounted on a common horizontal axis, and rotate in the bowl much as a crushing mill with vertical runners. The rolls, which are attached horizontally at the end of a rotating vertical axis, travel, moreover, in a circle in the bowl so that every point of the bowl is reached by the rolls. Hereby a thorough and uniform kneading of the cement mixture is attained. The procedure in the use of the machine is as follows:

The weighed cement is placed in the bowl, the rolls being raised first by merely lifting the handle. Then the correct amount of water is added, the rolls are lowered into the bowl, and the motor is started. After a thorough kneading for 3 minutes the apparatus stops automatically. The setting time in the control test was the same for hand kneading and machine kneading; but the hand kneading required 26½ per cent. of water as per standard, and the machine kneading used 27 per cent., which is due to the larger surface of rolls and bowl.—*Zement*, vol. 29, no. 45 (Nov. 7, 1940), pp. 575-6.

TRAFFIC News Digest

I.C.C. Reports

Cement — Docket No. 28636, Utica Hydraulic Company *vs.* Indiana Railroad *et al.* heard by Examiner Harold M. Brown. A rate of 25 cents charged on cement, shipped since March 24, 1941, from Utica, Illinois, to Boys

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School, Indiana, found inapplicable. The examiner said the applicable rate was 24 cents and was unreasonable to the extent it exceeded 15 cents, the rate claimed. Reparation with interest was proposed.

Sand and Gravel—Fourth-section application No. 18703, sand and gravel from and to Louisiana. Authority granted by F. S. O. 14334 to establish and maintain, subject to conditions, rates on sand, gravel, crushed stone, and related commodities, in straight carloads, in interstate commerce between points in Louisiana and between points in that state and points in Texas, Oklahoma, Arkansas, and southern Missouri, as to which temporary relief was given by F. S. O. 14019, as supplemented without observing the long-and-short-haul part of the fourth section.

Talc and Soapstone—Fourth-section application No. 18764, talc and soapstone to the south. Authority granted by F. S. O. 14336 to establish and maintain, on conditions, the rates on talc, talc tailings, and soapstone, from points in trunk-line (including Buffalo-Pittsburgh territory) and New England territories to points in southern territory, as to which temporary relief was given by F. S. O. 14057, without observing the long-and-short-haul part of the fourth section.

Cement — Fourth-section application No. 18276, cement from Norfolk, Virginia to West Virginia. Authority granted by F. S. O. 14333 to establish and maintain rates on cement, subject to conditions, from Norfolk, Virginia, to points in West Virginia, as to which temporary relief was given by F. S. O. 13763, without observing the long-and-short-haul part of the fourth section.

Stone and Asphalt Rock — Fourth-section application No. 18800, asphalt rock from Oklahoma and Texas to Mississippi. Authority granted by F. S. O. 14325 to establish and maintain rates, subject to conditions, on asphalt rock and stone, from producing points in Oklahoma and Texas to destinations in Mississippi, as to which temporary relief was given by F. S. O. 14079, without observing the long-and-short-haul part of the fourth section.

Crushed Stone — Fourth-section application No. 18995, crushed stone to Kingsbury, Indiana. Authority granted by F. S. O. 14327 to establish and maintain, subject to conditions, rates not lower than 99 cents a net ton on crushed stone, carloads, from Chicago and Joliet, Illinois, to Kingsbury (Dillon), Indiana, without observing the long-and-short-haul part of the fourth section, as to which temporary relief was given by F. S. O. 14179.

Ferro-Calcite Rates—The Ohio Calcium Company of Ironton, Ohio, has asked the Commission to suspend increase proposals on roasted ferro-calcite rates made by the Detroit, Toledo & Ironton, dated to be effective September 15. The company stated that proposed increased rates on ferro-calcite, roasted, from Lawrence, Ohio to iron and steel producing points in Illinois, Indiana, Michigan, New York, Ohio, Pennsylvania and West Virginia would result in the impairment if not destruction of its investment and would result in unemployment and violate the Interstate-Commerce Act.

It was declared that ferro-calcite, roasted, also called "calcifer," is a fluxing material, used only in the iron and steel industry. According to Clyde N. Thompson, the company's traffic consultant who filed the request for suspension, the investment in the plant at Lawrence is in excess of $200,000. The request stated that the establishment and maintenance of the proposed rates will cause unemployment of about 125 persons and deprive the iron and steel industry of the use of the material. Thompson stated the rates other than those proposed are under attack by the company in formal docket No. 28666. The proposal is not only to change the rates but also to change the minimum from 90 per cent. of marked capacity of the car to 60,000 pounds. One rate illustrating the situation is $2.14 a net ton from Lawrence, Ohio, to Detroit, Michigan. The proposed rate is $2.80.

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Motor Proposed Reports

East Providence, Rhode Island. MC 45603, Sub. No. 1—Fred H. Murphy, common carrier extension. Joint board 134. Certificate proposed. Sand, gravel, stone, road-surfacing material, brick and solid fuel, between designated points in Rhode Island to designated points or areas in Connecticut and Massachusetts.

Norristown, Pennsylvania. MC 102323—Gus Bono, common carrier application. Examiner G. E. Proudley. Certificate proposed. Bituminous concrete, asphalt, crushed stone, sand, gravel and brick, Upper Merion township, Montgomery county, Pennsylvania, and points within ten miles thereof except those points that have rail sidings, to points in Delaware, Maryland, and New Jersey. Also on ground limestone, Norristown and points in Chester and Delaware counties, Pennsylvania, to points in Delaware and Maryland.

Taunton, Massachusetts. MC 95713, Sub. No. 2—James Sylvia, extension of operations on road building materials. Joint board 134. Certificate proposed. Sand, gravel, stone, cement and excavating materials between points in

Rhode Island, on the one hand, and points in Connecticut and Massachusetts, on the other.

Bloomfield, New Jersey. MC 62347, Sub. No. 1, John E. Kulpa, extension —Connecticut, etc. Examiner E. T. Cosby. Certificate proposed. Plaster, plaster board and plaster blocks, in quantities of not less than 15,000 pounds, from Newark, New Jersey, to points in Connecticut and New York, within 150 miles of Newark.

Turner, Kansas. MC 102263. Charles Partonnar, common carrier application. Joint board 36. Denial of certificate proposed. Sand, gravel, tile, cement, cement blocks and plaster, between Turner and points in Kansas and Missouri.

Spokane, Washington. MC 102647. H. A. and A. W. Price common carrier application. Joint board 169. Certificate proposed. Cement blocks and cement, and clay brick, between Spokane on the one hand and points in Idaho and Washington, on the other.

Paris, Illinois. MC 96418. Clyde Cornwell, common carrier application. Joint board 21. Certificate recommended. Coal, mines in Parke and Vigo counties, Indiana, and sand and gravel, points in Parke and Vermillion counties, Indiana, to points in Edgar county, Illinois.

Quincy, Massachusetts. MC 7674, Sub. No. 2, Margaret I. Bonome, and Leonard Bonome, common carrier application. Joint board 134. Certificate proposed. Rough granite, from points in Connecticut and Rhode Island to points in Massachusetts.

Pulaski, Virginia. MC 102119. James L. Kesling, contract carrier application. Joint board 7. Permit proposed. Asphalt coated stone, from Galax, Virginia, to points in North Carolina, on the Blue Ridge Parkway Drive within 30 miles of the Virginia-North Carolina state line.

Central Freight Association

Docket 67946—Molding sand, as described and minimum weight as provided in Item 1350, C.F.A.L. Tariff 155-V. Establish a rate of $4.51 per net ton from Zanesville, Ohio, to Wausau, Wisconsin, *via* rate-making gateway.

Docket 67966 (Shipper's proposal)—Rock gypsum, ground, carload, minimum weight 80,000 pounds. Establish rate of $3.50 per net ton from Grand Rapids, Michigan, to Kaukauna, Mosinee, Nekoosa, and Point Edwards, Wisconsin. Also a rate of $3.90 per net ton from Grand Rapids, Michigan, to Tomahawk and Wisconsin Dam, Wisconsin.

Docket 68088 (Carrier's proposal)—Sand, all kinds, and gravel, in open top cars, carload, minimum weight 90 per cent. of the marked capacity of the car except when the car is loaded to full cubical or visible capacity actual weight will apply. Establish a rate of 99 cents per net ton from Madison, Ohio, to Niles, Ohio. Basis of Ohio Docket 10400 scale.

Docket 68107 (Carrier's proposal)—Cement, common, hydraulic, masonry mortar, natural or portland, carload, minimum weight 50,000 pounds. Establish a rate of 29 cents per hundred weight from Speeds, Indiana, to Hopewell, Virginia.

Docket 68144 (Carrier's proposal)—Lime, agricultural, common, fluxing, hydrated, quick or slacked. Cancel rates on, from Cold Springs, Ohio, Edwardsville, Illinois, and Indianapolis, Indiana, to various destinations in C. F. A. territory as published in N. Y. C. Tariffs 1535-P., I. C. C. 8721; 1913-B, Ohio 2855; 1923, Ohio 2666, account obsolete. Classification basis to apply.

Docket 68153 (Shipper's proposal)—Stone, fluxing, furnace or foundry, melting or refractory, unburnt, in bulk in open top cars, carload, minimum weight 90 per cent. of the marked capacity of the car except when the car is

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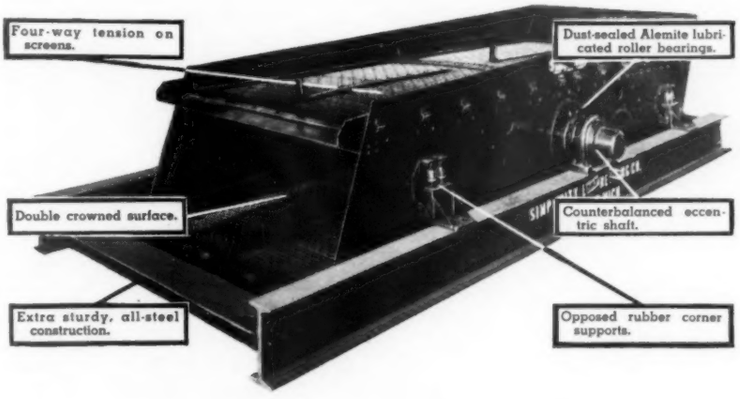

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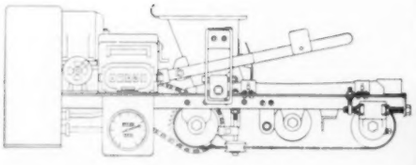

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loaded to full cubical or visible capacity actual weight will apply. Establish a rate of $1.24 per gross ton from Genoa, Ohio, to Midland, Pennsylvania.

Docket 68225—Stone, fluxing, furnace or foundry, melting or refractory (unburned), in bulk in open top cars, carload, establish a rate of $1.03 per gross ton from the Annandale, Pennsylvania district to Mingo Junction, Ohio. Also a rate of $1.03 from Worthington, Pennsylvania, to Mingo Junction, Ohio. Also a rate of 88 cents from Worthington, Pennsylvania, to Youngstown, Ohio.

Docket 68270 (Shipper's proposal)—Agricultural limestone, unburned (not ground or pulverized) in bulk, in open top cars only, carload, minimum weight 90 per cent. of the marked capacity of the car, except when car is loaded to full cubical or visible capacity actual weight will apply. Establish a rate of $1.27 per net ton from Narlo, Ohio, to Dover, New Philadelphia, Parral, and Strasburg, Ohio, *via* usual available routes.

OCCUPATIONAL DISEASES and the LAW

Negligence

Dean v. Dalton Foundries, Inc., decided by the Appellate Court of Indiana, in banc, May 27, 1941; reported at 34 N.E. (2d) 145.

In this suit an employee charged that he became afflicted with pneumoconiosis and tuberculosis, and that the employer was liable under the Indiana Employers' Liability Law, Section 40-1101, Burns' Indiana Statutes Annotated 1933, Section 10100-1, Baldwin's Indiana Statutes Annotated 1934. Negligence was predicated upon the alleged failure of the employer to provide the work place with sufficient means of ventilation as required by the Factory Act, Section 40-1013 of Burns' and Section 10072 of Baldwin's Statutes, and in failing to provide exhaust fans of sufficient power for the purpose of carrying off the dust from emery wheels, grind-stones and dust-creating machinery as required by Section 40-1005 Burns' or Section 10066 Baldwin's Statutes.

Against the employer's claims and contrary to the decision of the trial court, the appelate court holds that an action for occupational disease may be maintained under the Employers' Liability Act, that the action may be predicated upon failure to comply with the Factory Act, and that the requirements of the Factory Act are not void for vagueness or uncertainty. "The law is well settled in this state that any occupational disease which is the proximate result of the negligence of the employer is actionable and any occupational disease which is not the proximate result of the negligence of the employer is not actionable." The evidence in the case is held to warrant a directed verdict for the employer, and the case is remanded to the trial court for a new trial.

Compensation

Rando v. *State Workmen's Insurance Fund et al.,* decided by the Superior Court of Pennsylvania, July 18, 1941; reported at 21 Atl. (2d) 530.

The Pennsylvania Occupational Disease Act of July 2, 1937 (Pamphlet Laws 2714; 77 Pennsylvania Statutes, Sections 1101 *et seq.*) provided that in cases of compensation for total disability or death from silicosis, anthraco-silicosis or asbestosis the total liability of the employer should not exceed $3,600. In a separate section it provided that if disability or death occurred within the first year in which the act was effective, the employer should be liable only for one-tenth of the compensation payable,

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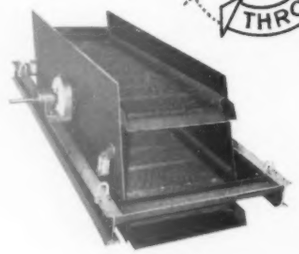

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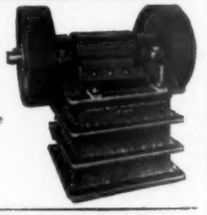

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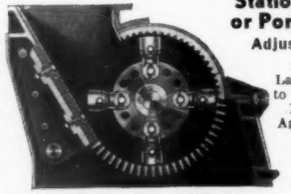

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the remainder to be paid by the commonwealth out of the State Workmen's Insurance Fund, and that thereafter the proportion payable by the employer should increase by one-tenth each year until after ten years the employer should be liable for all the compensation payable.

In this case an employee, disabled from anthraco-silicosis within the first year in which the act was effective, maintained that he was entitled to the specified maximum of $3,600 from the employer, and, in addition, to payments by the commonwealth up to nine-tenths of the weekly benefits fixed by the Workmen's Compensation Act amendment of June 4, 1937 (Pamphlet Laws 1552; 77 Pennsylvania Statutes, Section 511), for the remainder of his life. The State Workmen's Insurance Board, however, held that $3,600 was the limit of the employee's compensation, of which one-tenth was payable by the employer and nine-tenths by the commonwealth, and that decision is affirmed in this court proceeding.

The court notes that the Occupational Disease Act of June 21, 1939 (No. 284; Pamphlet Laws 566; 77 Pennsylvania Statutes, Sections 1201 *et seq.*), which repealed and superseded the act of 1937, made it clear that the compensation payable to an employee who was totally disabled by reason of silicosis, anthraco-silicosis or asbestosis should not exceed $3,600, whether payable solely by the employer or jointly by the employer and the commonwealth out of the Occupational Disease Fund created by that act. The court is of the opinion that the act of 1939 in this respect did not change, but merely clarified, a disputed provision in the act of 1937.

Limitations

Lutman v. American Shoe Machinery Company et al., decided by the St. Louis Court of Appeals, Missouri, June 3, 1941, rehearing denied June 17, 1941; reported at 151 S.W. (2d) 701.

Earlier Missouri cases have developed the principle that in an occupational-disease case the time of the "injury" is that time when the disease causes a compensable disability. In this case, however, the evidence showed that the workman did not file his claim within six months after it was reasonably discoverable that he had suffered such a disability, and compensation was denied under Section 3337, Revised Statutes of Missouri, 1929. The disability resulted from pneumoconiosis, and the workman had been employed in grinding iron castings. He quit his job in June, 1938, rather than wear a respirator. The claim was filed on January 6, 1939, and it was contended that the six-months limitation ran only from the time the worker was examined by a physician, which was in December of 1938. The Missouri Workmen's Compensation Commission held, however, that the disability was reasonably discoverable before that time, since as early as 1936 the workman knew something of his condition; he testified that he was sick at his stomach "from that old dust" and spit up from it, and that he knew before June, 1938, that there was "something wrong with his lungs." The commission's decision is sustained by the appellate court.

LABOR DECISIONS

Strike

El Paso Electric Company v. National Labor Relations Board, decided by the U. S. Circuit Court of Appeals, Fifth Circuit, April 25, 1941, rehearing denied court, consequently, directs that the cease-and-desist order be modified so as to make sure that the union is the representative of the employees by free will and choice of the majority. Other portions of the order are modified on the facts.

Order to Bargain

Singer Manufacturing Company v. National Labor Relations Board, decided by the U. S. Circuit Court of Appeals, Seventh Circuit, March 21, 1941; reported at 119 Fed. (2d) 131.

The petitioner in this case challenged the power of the National Labor Relations Board to order it to cease and desist from refusing to bargain with a union representing its employees, claiming that such an order is "vague and indefinite." The court holds, however, that the order was appropriate. "If substantial evidence supports the finding of no *bona fide* attempt to bargain, the board may not dictate the terms of the formal contract, but it may direct the petitioner to do what the act requires —to bargain in good faith. In this we think there is no vagueness. We have no doubt that if the petitioner so acts as to indicate its *bona fides,* it will experience no difficulty. It can not be forced to enter into an agreement, but it can be compelled to conduct negotiations in an honest attempt to arrive at an agreement in conformity with the spirit and intent of the act. The negotiations may fail, but the petitioner will experience no hardship in so acting as to convince the board or the court of its honesty of purpose." The order is also upheld on the evidence, but modified as to scope.

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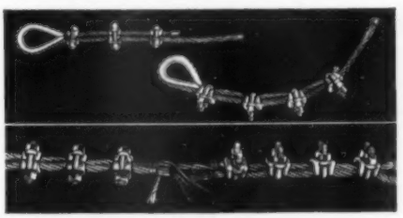

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Interstate Commerce

Baggett v. Henry Fischer Packing Company, decided by the U. S. District Court, Western District of Kentucky, February 24, 1941; reported at 37 Fed. Supp. 670.

A former employee seeks in this suit to recover unpaid overtime compensation under the Fair Labor Standards Act of 1938. The complaint does not show that he was engaged in interstate commerce or in the production of goods for interstate commerce. The court rules that even though the employer is engaged in interstate commerce, the act applies only to employees who are engaged in interstate commerce or in the production of goods for interstate commerce, and that a Federal court has no jurisdiction unless such a fact is alleged. In this instance the suit will be dismissed unless the complaint is appropriately amended.

Tips

Williams et al. v. Jacksonville Terminal Company, decided by the U. S. Circuit Court of Appeals, March 4, 1941, reported at 118 Fed. (2d) 324 (affirming district court judgment, 35 Fed. Supp. 267), and *Union Terminal Co. v. Pickett,* same court, same day, rehearing denied April 2, 1941, 118 Fed. (2d) 328 (reversing 33 Fed. Supp. 244).

These cases establish, in substance, that red caps at the Jacksonville, Terminal are employees subject to the Fair Labor Standards Act, and that after the company notified them to report the amount of tips received so that it could make up any difference between any red cap's receipts and the minimum wage the tips were funds of the company rather than gratuities to be retained in addition to the minimum wage.

Representative

Pueblo Gas & Fuel Company v. National Labor Relations Board, decided by the U. S. Circuit Court of Appeals, Tenth Circuit, March 12, 1941; reported at 118 Fed. (2d) 304.

The employer, a gas-distributing system, defended its refusal to bargain with a union designated by its employees on the grounds that the union was an electrical workers' union to which its employees were not eligible for membership, and that the company could not lawfully be required to bargain with a union a majority of whose members are employees of a rival industry. The court holds, however, that the controlling facts was that the employees did designate the union as their bargaining agency, so that the employer's refusal to bargain was an unfair labor practice. It is also ruled that a gas company distributing gas which flows from wells in another state is subject to the National Labor Relations Act since a labor dispute would affect this interstate commerce.

Discrimination in Hire

Phelps Dodge Corporation v. National Labor Relations Board and *National Labor Relations Board v. Phelps Dodge Corporation,* decided by the U. S. Supreme Court, April 28, 1941; reported at 61 S. Ct. 845.

This decision affirms the interpretation of the National Labor Relations Act to forbid discrimination in the hiring (as well as in the discharging) of employees on the ground of union activities, and the power of the National Labor Relations Board to take action in case of a violation, including (in this case) the power of the board to order the employer to offer jobs to the workers so discriminated against and to reimburse them for the loss of pay resulting from the refusal to hire them. Furthermore, "the mere fact that the victim of discrimination has obtained equivalent employment does not itself preclude the board from undoing the discrimination and requiring employment," and in each case the board should be guided not by the vindication of rights of individuals, but by the question whether the action taken effectuates the policies of the act.

Continental Oil Company v. National Labor Relations Board was decided the same day on the same grounds.

Rate of Pay

Fleming v. Carleton Screw Products Company, decided by the U. S. District Court, District of Minnesota, Fourth Division, March 13, 1941; reported at 37 Fed. Supp. 754.

On the effective date of the Fair Labor Standards Act of 1938 the employer involved in this case put into effect an agreement with its employees whereby the hourly rates of pay were reduced, but it was agreed that if any employee earned less, after overtime at time-and-a-half was paid, than what he would have earned at his former rate at straight time, the company would pay him the difference as a "bonus." The employees accepted the agreement as an alternative to reduction of their weekly earnings by reduction of operations to 44 hours a week. The court rules that the scheme, if permitted, would completely nullify the overtime provisions of the act, and that it is a violation of the act; also that the company's records are kept in a manner that violates the act. An injunction against further violations is granted.

Wage Order

People on Information of Siegel v. Weingrad, decided by the Court of Special Sessions of the City of New York, Part 2, Borough of Brooklyn, April 3, 1941; reported at 26 N.Y.S. (2d) 841.

The defendant in this case was charged with violating Section 564 of Article 19 of the New York Labor Law in failing to pay wages due to female workers under an order promulgated by the Industrial Commissioner pursuant to that law. It was contended that the order and the statute were invalid on the ground that legislative powers were delegated to the commissioner. The court rules, however, that the statute set up a sufficient standard for promulgating the order, and that the statute and the order are valid. The fact that a former Article 19 of the Labor Law, Chapter 584 of the Laws of 1933, was declared unconstitutional, does not affect the validity of the present law, enacted by Chapter 276 of the Laws of 1937, even though both cover the subject of minimum-wage standards for women and minors.

Court

Stringer v. Griffin Grocery Company, decided by the Court of Civil Appeals of Texas, Dallas, February 8, 1941, rehearing denied March 15, 1941; reported at 149 S.W. (2d) 158.

The point here decided is that (as has been held in various other state and federal courts), any federal, state or territorial court "whose jurisdiction over cases of like nature is not prohibited by law" is a "court of competent jurisdiction" in which employees may sue for unpaid wages or overtime, liquidated damages and attorney's fees under the Fair Labor Standards Act of 1938.

Records

Cudahy Packing Company of Louisiana, Ltd. v. Fleming, decided by the U. S. Circuit Court of Appeals, Fifth Circuit, April 19, 1941; reported at 119 Fed. (2d) 209.

The Administrator of the Wage and Hour Division issued a subpoena under the Fair Labor Standards Act of 1938 requiring the employer in this suit to appear before a representative and produce certain documents relative to wages and hours. The company declined to comply, and the district court granted an order compelling obedience to the subpoena, with exceptions as to some of the records called for. That order is affirmed in this appeal. "There is no doubt," says the court of appeals, "the administrator had authority to issue the subpoena and the court had jurisdiction to enforce it."

Corporations

Press Company, Inc., v. National Labor Relations Board, etc., decided by the U. S. Court of Appeals for the District of Columbia, December 9, 1940, rehearing denied, February 14, 1941, supplemental opinion filed, March 24, 1941; reported at 118 Fed. (2d) 937.

This decision sustains, with modifications, a cease-and-desist order of the National Labor Relations Board against a newspaper publisher; the order is held not to violate "freedom of the press" and to be justified (as modified) by the evidence. A corporation owning the common and half of the preferred stock of the corporation which publishes the newspaper was removed from the operation of the order because of the court's conclusion that the corporation was not an employer of the employees involved and that the publishing corporation is self-governing.

Statements

Quaker State Oil Refining Corporation v. National Labor Relations Board, decided by the U. S. Circuit Court of Appeals, Third Circuit, April 17, rehearing denied June 5, 1941; reported at 119 Fed. (2d) 631.

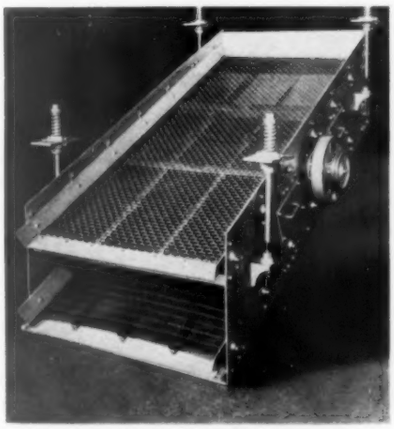
The National Labor Relations Board found the employer guilty of two unfair labor practices. The first was that two supervisory employees by their statements to individual employees discouraged membership in a union. The statements, however, took place casually in the course of conversations between the individuals concerned, and there is no evidence that they had the slightest effect in actually preventing or discouraging membership in the union, and the court refuses to enforce the cease-and-desist order based upon the board's findings. "Isolated statements by minor supervisory employees made casually in conversation with fellow employees without the knowledge of their employer and not in the course of duty or in the exercise of their delegated authority over those employees ought not to be too quickly imputed to their employer as its breach of the law. This is particularly so where, as here, there is no evidence of any policy on the part of the employer to authorize or encourage opposition to union activity."

The second unfair labor practice charged was the employer's discharge of a workman which the board found was ordered because of his activity in the union. The court holds, however, that the evidence shows that the reason for the discharge was a second violation of a company rule against outside employment, rather than the union activity, and the order of reinstatement will not be enforced.

NEW MACHINERY and SUPPLIES

• Vibrating Screen

The Denver-Dillon vibrating screen is so unique in its application of circle-throw action that a basic patent was allowed on the principle. Briefly, this simplified machine consists of a screen body eccentrically mounted on a concentrically rotatable shaft. Only two bearings are required, these at the eccentric positions. The machine is carried on four spring-cushioned, live-rubber-insulated, suspension rods which relieve the shaft and bearings of load, strain and shock. The screen assumes its unalterable full floating, true circle vibration, in absolute static and dynamic balance. Its distinctive automatic adjustment to load is truly and aptly described as "floating-circle motion."



Circle-throw-action screen.

The screens, a product of the Denver Equipment Company, Denver, Colorado, are built in sizes up to 6 by 14 feet, in 1, 2 or 3 decks. Standard machines are equipped with the four suspension-rod assemblies and necessary brackets for fastening to any substantial structural supports. The initial covering of standard steel screen cloth is included, for separations down to 20-mesh. Finer specifications and other metals are supplied at their extra cost.

The suspension frame is incorporated in the base plate for motor or jackshaft, completing the unit. This frame can be suspended, connected to existing steel or wood members, supported on legs, or any combination of these three methods. The rod brackets are ingeniously pivoted on the screen body and the suspension frame. The assembly is an adjustable parallelogram. The point of rotation is about the feed end of the screen. This makes it possible to adjust the operating angle without disturbing the feed chute or affecting rod or belt centers or lengths.

• Excavator

The Lima Type 603 is a combination shovel, drag-line and crane. When used as a shovel, it is equipped with a 21-foot boom, 17-foot dipper handle and a 1½-cubic yard dipper.

TRADE MARK
KEYSTONE
REGISTERED U. S. PATENT OFFICE

1-Yard and 1¼ Yard

Keystone offers a standard *1¼ yard dipper and crane, Model 19-A,* for rock excavation and quarry clean-up. *Model 18-A, 1 yard,* is adapted for special service—*trench hoes* for crevice cleaning upon serrated rock strata; *skimmers* for sand strata separation and recovery, etc. . . . We have had a long and varied experience in handling difficult and unusual excavation problems. Ask for bulletins.

ROCK SHOVELS
DIPPERS
BACKHOES
SKIMMERS
DRAG LINES
CRANES

KEYSTONE DRILLER CO.
BEAVER FALLS,
PENNSYLVANIA

As a crane, it has a maximum lifting capacity of 25 tons. Drag-line capacity is variable, depending on the nature of the work.

The shovel boom is the box-type design, electrically welded throughout. The dipper handle is of the same modern construction. The Type 603 is available with either a gasoline, Diesel, oil or electric power unit. Inside-expanding clutches have housings cooled through radiation fins. The clutches and brakes are of extra large diameter. Roller bearings are applied to the hoist brake and clutch housings to effect smooth, velvety clutch action. The hoist clutches are equipped with vacuum power assistors operating through toggles which makes possible the raising or lowering of loads with accuracy and ease without the operator losing the "feel" of the work. This feature is especially adapted to crane work.

Type 603 convertible excavator.

Each major operation is independent of the other, which makes it possible to hoist, travel, swing and raise or lower the boom simultaneously. The cast-steel drum laggings are split and are easily changed to fit exactly the right line speed for any job. Helical-cut gears are used throughout to assure smooth, quiet operation. Roller bearings are used at every vital bearing point. The crawler truck is composed of a one-piece base casting with four through axles on the ends of which revolve eight open type self-cleaning rollers. It is of the end drive principal with drive chain located back under the crawler treads. Steering is accomplished with the upper frame at any position, which is an advantage when propelling in close quarters. The crawlers are so designed that they can be extended in length to increase the ground bearing area. The change from short crawlers to long crawlers can be made without dismantling the machine.

The cab has an in-built winter front which can be removed when it is not needed. More than one-half of the cab can be opened to give ample ventilation in hot weather.

Roebling Observes 100th Anniversary

John A. Roebling's Sons Company, prominent wire-rope maker and builder of the Brooklyn Bridge, observed the 100th anniversary of its founding on September 19 at Trenton, New Jersey.

Editors and publishers of trade journals and magazines from various parts of the country were among those who attended a series of events marking the company's centennial.

SERVICE and ECONOMY From CONTINUOUS OPERATION

THAT'S SECO!

Screen Equipment Co.
INCORPORATED
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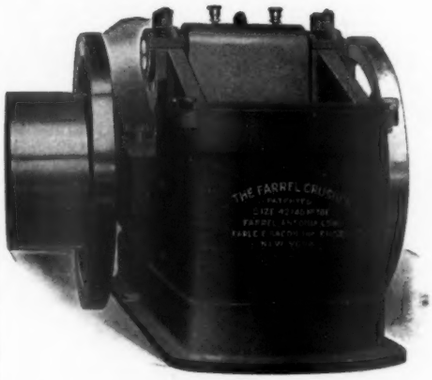
Complete plants designed and equipped, including Screens, Elevators and Conveyors. Machinery for Mines and Rock Quarries, Sand and Gravel Plants. Engineering Service.



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THIS LOADER ON RUBBER TIRES

digs and loads 3 yds. a minute with typical Haiss efficiency—and has the travel speed mobility to "get around" f-a-s-t. At the price, it's a bargain in stockpile loading capacity!

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George Haiss Mfg. Co., Inc., 142nd St. & Rider Ave., New York
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Portable Conveyors—Revolving Screens

PERFORATED METAL SCREENS
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Any size or style screen, in thickness of steel wanted with any size perforation desired.

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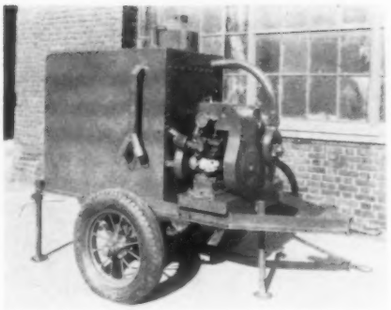


Drill hoses used in connection with the Kadco dust-control machine shown above allow the operator to work in a dustless atmosphere without danger of silicosis. Drilling costs are also reported to be lower when the system is employed. Three sizes are available. Complete details should be in the hands of every quarry operator and will be sent on request to the Kadco Corporation, Long Island City, New York.

Following the quick acceptance by industry of its lift-truck Model LT-40 for loads up to 3,000 pounds, the Towmotor Company, Cleveland, has introduced a companion model, the LT-44, built along similar lines, but capable of lifting 4,000 pounds at 15 inches from the carriage. The LT-44 Towmotor has a 44-inch wheelbase, with a turning radius of only 72 inches.

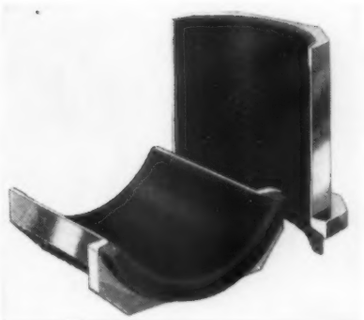
Tournaweld, developed and manufactured in the LeTourneau plant at Peoria, Illinois, expressly for the various welding applications used in the manufacture of LeTourneau equipment, is now available for general maintenance work from the Caterpillar-LeTourneau distributor organization. It is available in the following diameters: 5/16, 9/32, 1/4, 7/32, 3/16, 5/32 and 1/8 inch.

Bearing

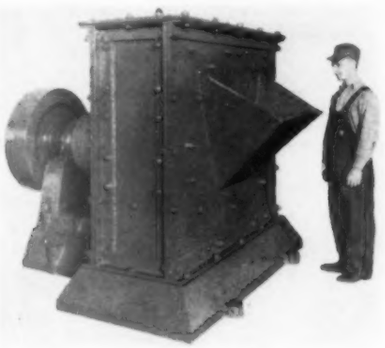
The Gatke Corporation, Chicago, announces the development of a special moulded-fabric bearing for crane-track wheel, trolley and line-shaft service.

Compared with conventional bearings, it is claimed these fabric bearings give many times longer service, have less starting friction and less running friction. Lubrication is much less critical, and the bearings do not score journals. Even if lubrication fails, journals are said not to be damaged.

They are said to be giving excellent service on installations where anti-friction bearings have proved entirely impracticable and conventional bearings give extremely limited service.



New molded-fabric bearing.

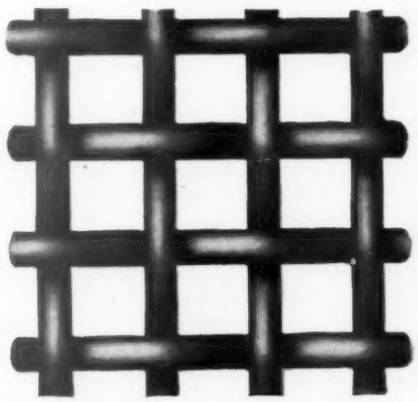


The improved Stedman single-cage disintegrators, a 42-inch model being pictured above, were designed primarily as fine-reduction crushers by the maker, Stedman Foundry & Machine Works, Aurora, Indiana. Its chief advantage is said to be its ability to produce a large yield of cubical product in the finer sizes. It will produce from 75 to 100 per cent. of crushed material and surplus material of any size can be re-run through the machine to produce even higher quality crushed aggregates. Five sizes are available with capacities ranging from 10 to 300 tons per hour. The fifth, or largest, size is not ready for general sale, however, but is expected to be within a few months.

Level Control

The new Photoswitch Electronic Level Control (Series P16) provides on and off valve or pump control of any liquid. Complete equipment is available for single-level indication and control, on and off pump-up and pump-down control at two levels, boiler-feedwater control and low-level safeguards. Probe fittings have

ROEBLING
ABRASO
SCREEN
TRADE JERSEY MARK



ROEBLING STEEL
Assures Long Life

Roebling "Abraso" Screening is made of special steel—manufactured by *custom methods* in Roebling's own mill. It is steel that offers maximum resistance to the BEATING of stone and gravel.

To further assure long screening life, Roebling controls every step of manufacture from steel making to fabrication.

Roebling "Abraso" Screening is available for every sizing, cleaning and grading service.

JOHN A. ROEBLING'S SONS COMPANY TRENTON NEW JERSEY

Branches in Principal Cities Export Division: 19 Rector St., New York, N.Y., U.S.A. Cable Address: "Roebling's", New York

TRI VIBE

The "V" campaign has spread to the screening industry, where Tri-Vibe-equipped Vibrating Screens are winning a victory over high costs. Today, these LEAHY Type "C" No-Blind Vibrating Screens are doing their part by increasing production in all defense projects requiring fine mesh materials. Specify Tri-Vibe and get triple vibrating action in that next screen you buy.

Write for Bulletin 14-H

The Deister Concentrator Company
The Original Deister Co.
Est. 1906
911 Glasgow Ave., Fort Wayne, Ind.

SAVE PRIORITY METALS FOR DEFENSE

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MANGANAL

Crushers, shovel and dipper teeth, tractor treads, pump parts, and a score of other pieces of equipment can be saved—made better than new and at insignificant cost—by the MANGANAL Method. Distributors everywhere carry MANGANAL 11 to 13½% Manganese Nickel Steel welding electrodes, applicator and wedge bars, plates and SEACO hard-surfacing electrodes. Write for the name of the distributor nearest you and a copy of the latest price list.

STULZ-SICKLES CO.
Newark New Jersey

been designed for high and low pressure and temperature requirements as well as for sanitary installations.

The probes or electrodes are attached to the tank at levels representing the low point where pumping starts and the high level where pumping stops. These probes are wired to the Photoswitch Level Control. When the liquid level falls below the lower probe, the level control starts the pump in operation and the tank fills. When the level rises to the upper probe, the fluid itself acts as a conductor of the small amount of current required for the operation of level control which stops the pump. Even when used with nonconductive fluids, the probe circuit carries only milliamperes of current and low voltage.

Since Series P16 controls do not involve mechanical float or pressure switches, they are easily installed and maintenance free.

• Hydraulic Packer

The Syntron Company, Homer City, Pennsylvania, is placing on the market a new line of water-powered hydraulic packers, or jolters. These are used for effecting a dense compaction or settlement of materials in barrels, drums, etc., particularly of light, fine, powdery materials that have heretofore been most difficult to pack.

Hydraulic jolter for compacting fine materials.

The Jolter is made up of a deck plate on which the barrel, drum, carton or other container to be filled and packed, is placed and a hydraulically-operated cylinder lifts the table and drops it with a sharp jolt approximately once per second.

The speed of the jolts per minute as well as the overall lift are controllable by a hand valve in the water line.

Trade Literature

HEAVY DUTY HORIZONTAL SINGLE-STAGE COMPRESSORS (Bulletin 194), 16 pages. Pennsylvania Pump & Compressor Company, Easton, Pennsylvania.

JACKS FOR ALL LIFTING JOBS (Bulletin 1066), 32 pages. Buda Company, Harvey, Illinois.

BETTER CONCRETE PRODUCTS, 28 pages. Medusa Products Company, Cleveland.

UNIT TYPE DUST COLLECTORS (Bulletin 907), Folder, Pangborn Corporation, Hagerstown, Maryland.

MEET LETOURNEAU (Bulletin G-1048), 20 pages, R. G. LeTourneau, Inc., Peoria, Illinois.

VIBRATORY MATERIAL HANDLING EQUIPMENT (Catalog 416), 48 pages. Syntron Company, Homer City, Pennsylvania.

HEIL DUMP BODIES AND HOISTS (Loose-leaf catalog). Heil Company, Milwaukee.

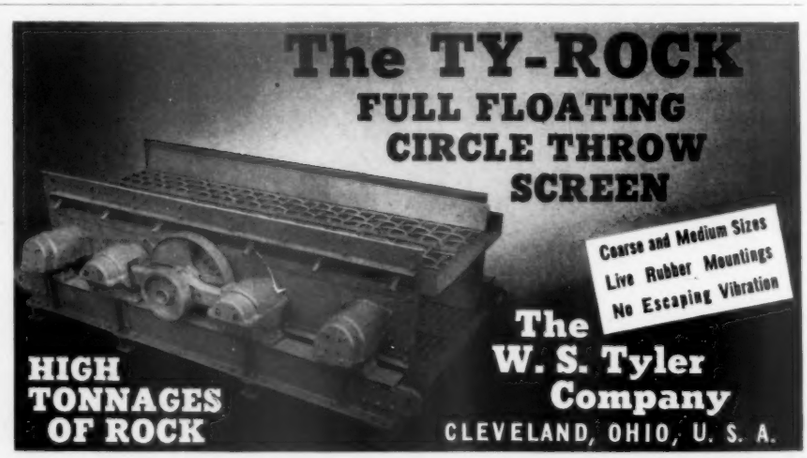
EFFICIENT CEMENT KILN FIRING WITH WHITING IMPACT PULVERIZERS, 4 pages. Whiting Corporation, Harvey, Illinois.

LO-MAINTENANCE MOTORS (Bulletin B6052-B), 8 pages. CENTRIFUGAL PUMPS (Bulletin B6059), 8 pages. TEXROPE DRIVES (Bulletin B-6051B), 12 pages. Allis-Chalmers Manufacturing Company, Milwaukee.

TRADE NOTES

The Asphalt Treatment Corporation, New York City, announces the appointment of the following contractors who are now acting as suppliers and distributors of Kotal in their respective territories: The General Crushed Stone Company at Winchester, Massachusetts; Watertown, New York; Le Roy, New York; and Quakertown, Pennsylvania; C. W. Blakeslee & Sons, New Haven, Connecticut; Andresen Corporation, Niles Center, Illinois; Highway Utilities Company, Niles Center, Illinois; Skokie Asphalt Company, Skokie, Illinois; Drummond & Company, Pikesville, Maryland; Mack Construction Company, Pawtucket, Rhode Island; Black Top Roads, Inc., Harrisburg and Hollidaysburg, Pennsylvania; Halton Amiesite Construction Company, Mt. Vernon, New York.

Announcement is made by the Peerless Pump Division of the Food Machinery Corporation of the completion and removal of its eastern offices and manufacturing facilities from Massillon, Ohio to a new and modern plant at Canton, Ohio.



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A Special Section of... CONCRETE PRODUCTS

WHEN Uncle Sam needs building units for defense projects, he wants them quick—and he wants them strong, dense, fire-resistant, water repellent. Because Stearns machines turn out that type of masonry unit, Stearns-equipped plants are furnishing blocks and bricks for important construction work at the new U. S. bases in the Atlantic and for arsenals, powder plants, forts, air bases, tank plants, industrial housing projects, government hospitals, camp barracks and hundreds of other defense efforts the country over.

WHEN *you* need concrete products plant equipment—block and brick machines, mixers, skip hoists—turn to Stearns. Select the equipment that makes high quality masonry units, at low cost and in great volume—the kind so widely employed in the Defense Program. Write today for circulars.

STEARNS MANUFACTURING CO. • ADRIAN, MICH.

The CONCRETE MANUFACTURER

October, 1941

A SPECIAL SECTION OF PIT AND QUARRY DEVOTED TO PRODUCTION MARKETING AND USES OF CONCRETE PRODUCTS AND READY-MIXED CONCRETE

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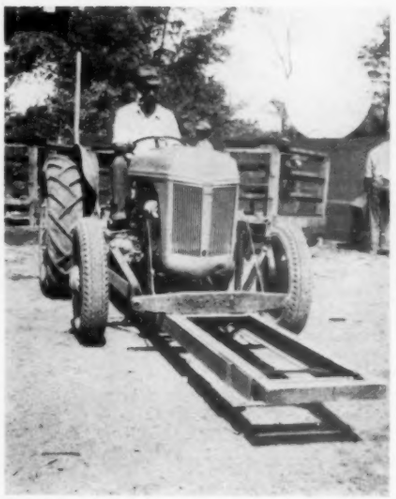


Two views showing the lift lowered and raised.

Tractor Converted to Lift-Truck

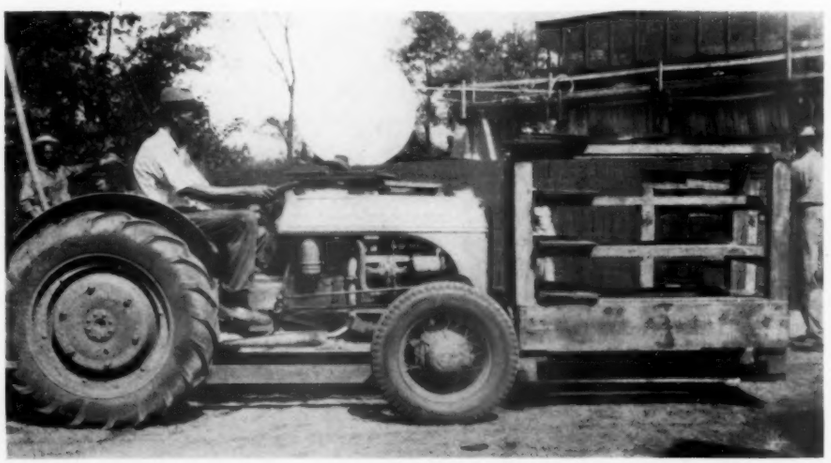
By F. P. JENKINS
Rockville Fuel & Feed Company
Rockville, Maryland

AN unusual application of a Ford tractor operating at our concrete-block plant saves one handling of from 5,000 to 20,000 blocks per day and, so far as we know, is the only Ford tractor that has been used as a "motorized jack-lift."

Operating a Besser Super Tamper 14 hours per day, we have an average daily output of approximately 5,000 units. Our yard is not level and, except for a concrete apron in front of the block plant, is not paved. Racks of blocks are moved from the curing rooms to the concrete apron by hand-operated jack-lifts and are taken from there to storage piles by the tractor. We use wooden curing racks having a capacity of 42 standard blocks. One of our racks loaded with 4- by 8- by 16-inch cinder blocks and the necessary pallets weighs 2,650 pounds.

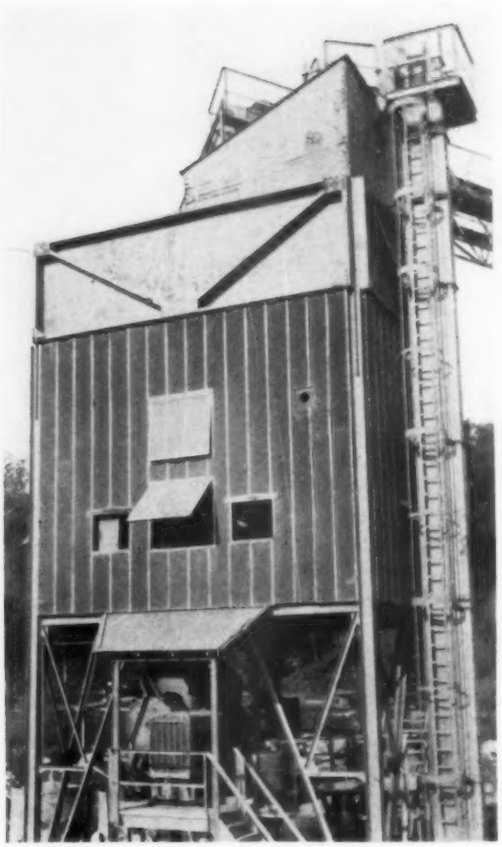
Prior to use of the tractor blocks were unloaded from the concrete apron to large trailers and subsequently towed to storage piles where they were again handled from the trailer to the storage pile. The present method not only saves one handling of all blocks but makes easier their final placement in storage piles. The tractor daily moves

(Continued on page 74)



Side view of the motorized lift-truck handling a block rack.

Concrete being discharged from 1-cubic yard mixer at tunnel plant into concrete cars hauled by an electric-battery locomotive.



The main mixing plant at the dam. The 2-cubic yard mixer is visible below.

Concrete Produced Under Precise Control at Mixing Plants Serving Saugatuck Dam

By W. E. TRAUFFER

THE problem of providing an adequate supply of water is one which constantly faces every growing community, regardless of its size. The growth of population, the expansion of industries, the growing use of air-conditioning, and other factors combine to put an ever-increasing strain on existing sources of water supply. Not only must adequate supplies of pure water be provided for present needs but careful plans must be made to meet larger demands for many years ahead. The highest type of engineering skill and foresight are needed.

Some of the large water-supply projects built in recent years have been given wide publicity. Among these is Boulder Dam which, when completed, was the largest dam in existence. Boulder Dam and the supplementary Parker Dam were built to insure an adequate supply of water and electric power for many years to come for the rapidly-growing city of Los Angeles and the communities surrounding it. The Colorado River Aqueduct, another tremendous engineering project, was built to carry this water hundreds of miles from Parker Dam on the Colorado River to the Los Angeles Area. At present the Delaware Aqueduct, another huge project, is being built to carry water from the Delaware River watershed to the New York metropolitan area.

No less important to their communities are the many smaller water-supply systems throughout the country which also call for a high degree of engineering skill. An oustanding example is the Bridgeport Hydraulic Company which supplies water to Bridgeport, Connecticut and surrounding communities, serving more than 200,000 people. This company was incorporated in 1857 and has constantly expanded its facilities to meet growing needs. Most of this expansion has taken place since 1901, when Samuel Senior, now chairman of the board, president, and chief engineer, was first employed as engineer and superintendent. An interesting sidelight is the fact that the showman, P. T. Barnum, perhaps Bridgeport's outstanding contribution to the American scene, headed the company from 1877 to 1886.

The Bridgeport Hydraulic Company has under construction the seventh and largest link in its chain of collecting reservoirs, Saugatuck Dam. This concrete dam will be 120 feet high above bed rock and 1,100 feet long and will impound 12,000,000,000 gallons of water in a reservoir covering 870 acres. It will have a daily draw-off capacity of 26,000,000 gallons, doubling the company's present available supply. Also a part of this project are a subsidiary dam 40 feet high and 750 long, a 2.25-mile aqueduct with two concrete-lined tunnels respectively 1,300 and 5,900 feet long, and the relocation of 7 miles of highways with numerous bridges and culverts.

All the more than 90,000 cubic yards

Bulk-cement storage tank.

of concrete required for this project is being made by two central-mixing plants, one at the dam and the other at one end of the longest tunnel. Both these plants are of the latest type, using the most modern of equipment and methods. Typical of the company's sound and progressive policies is the fact that both plants are equipped with the Scientific Concrete Service Corporation's precision-control method of concrete manufacture. This system, according to Mr. Senior has made it possible to produce a stronger, denser and more wear-resistant concrete than ever before. To secure the best possible results, Duff Abrams, father of modern design methods, is retained as consulting engineer and adviser on concrete design. Technicians of the Scientific Concrete Service Corporation are doing all of the testing excepting that of cement, and supervising all production and control operations under his direction. All the work is being done by the company's forces under the direction of Mr. Senior. W. C. Pollitt is resident engineer and W. C. Merrill is superintendent.

The first concrete was placed in December, 1939 in the bed of the Saugatuck River for the foundation of the dam. In 1940 concrete was placed from April to early in December. This year concreting was again begun in April and all the concreting is expected to be completed in October. The sand-and-gravel plant supplying all the aggregates for this project went into operation first, followed by the dam mixing plant. The tunnel mixing plant was in operation in May, 1941.

The gravel pit is located about 3 miles north of the dam in the bed of the reservoir. Like most other deposits, this one varies considerably in the gradation of its material, a condition which is corrected by the scientific control methods used. The material is sound and clean and has a sand content of about 30 per cent. The sand contains about 3 per cent. of silt and as much as possible of this is saved as it helps to make a denser concrete.

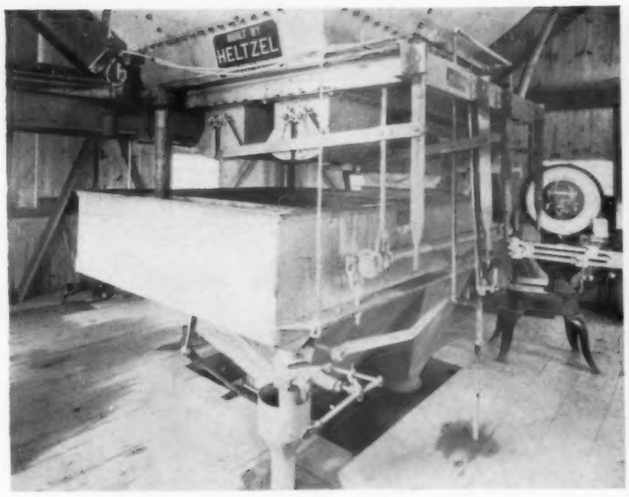
The preparation plant was furnished complete by the New England Road Machinery Company and has a capacity of 40 cubic yards per hour. It consists essentially of a grizzly, a revolving scalping screen, a crusher, a revolving sizing screen with a scrubber section, and sand-washing screws. The products made are sand, ¼- to 1¼-inch gravel, 1¼- to 2½-inch gravel, and 2½- to 6-inch gravel. A blend of all these four sizes of aggregates is used in both the face and the mass concrete for the dam, while only sand and the smallest size of gravel are used in the concrete for the tunnel. The control system contributes further to the economy of operation by making it unnecessary to have an expensive stock-piling and rehandling system in order to have a uniform moisture content in the aggregates.

The main mixing plant is near and in line with the dam. The aggregates are carried from the truck hopper on an inclined belt-conveyor to the Heltzel 390-ton steel bin, which has a separate compartment for each of the four aggregates. Bulk cement is elevated to a fifth compartment in the bin with a capacity of 500 barrels. The 2-cubic yard Heltzel 3-compartment combination weighing batcher is suspended on a Toledo dial scale to which a graphic recorder is attached. The aggregates are discharged at the one compartment of this batcher through lever-operated gates except for the 6-inch gravel which has an air-operated gate. The cement is discharged through a tubular valve into the second compartment and the water is weighed automatically in the third. All materials are then discharged in one operation into the mixer. The T. L. Smith 2-cubic yard concrete mixer is lined with Haynes Stellite and has mixed 80,000 cubic yards to date without replacement or repair of the shell.

The concrete is discharged from the mixer into 4-cubic yard Blaw-Knox concrete buckets placed on flat cars. A locomotive moves the cars a few feet to a point where the buckets are picked up by a cableway which spans the dam. This cableway has a 1,700-foot span and has a movable tail tower. Under ideal conditions 50 cubic yards of concrete can be placed per hour. The buckets are equipped with external pneumatically-operated vibrators to facilitate the discharge of the very dry concrete used. Three heavy vibrators are used to settle the concrete in place.

The tunnel mixing plant has a 110-cubic yard Blaw-Knox bin with separate compartments for sand, small gravel, and cement. The 1-cubic yard Blaw-Knox weighing batcher has three compartments for aggregates, cement and water. It also is connected to a Toledo dial scale with a graphic recorder. A 1-cubic yard Ransome mixer is used and the concrete is discharged into special 0.9-cubic yard bottom-dump concrete cars. In trains of five these cars are hauled by a Whitcomb electric locomotive equipped with Exide storage batteries.

Aggregates hopper at foot of conveyor.



The combination aggregate-and-cement batcher and special scale at main plant.

The combination aggregate-and-cement batcher and special scale at tunnel plant.

The tunnel is only 6 feet 4 inches in inside diameter and this lack of space made special concrete-handling methods necessary. The concrete is discharged from the cars on a belt-conveyor which feeds the Pressed and Welded Products Company "Prestweld" concrete gun. This machine shoots ½-cubic yard batches of concrete through a pipe-line to the point of pour. Blaw-Knox forms are used in the tunnel.

The dam is being built in blocks which are keyed vertically but not grouted together. The expansion joints are filled with a heavy grease which prevents the passage of water and allows for expansion and contraction. Cantilever forms are used and the pouring is done in 4-foot lifts. The forms consist of 2-inch tongue-and-groove sheathing with 4- by 10-inch studs spaced 30 inches apart.

All the mixes used are designed by Duff Abrams on the basis of perfect screening. Sieve analyses determine the carry-over of smaller sizes in the aggregate plant and the mixes are adjusted accordingly. A typical blend for a mass-concrete mix consists of 29 per cent. sand, 28 per cent. of ¼- to 1¼-inch gravel, 20 per cent. of 1¼- to 2½-inch gravel and 26 per cent. of 2½- to 6-inch gravel. The cement used is Government Specification SS-C-206, a medium-heat cement. The use of this cement, the low cement content of the concrete made possible by the control methods used, and the design of the dam together have eliminated the expansion cracks which formerly occurred in all mass concrete.

Two types of concrete are used in the dam. Type A, for face concrete, has a cement content of 1.06 barrels per cubic yard. This concrete has a compressive strength averaging about 2,000 p.s.i. at 7 days and 4,200 p.s.i. at 28 days. The water/cement ratio is 0.54 and the slump is less than one inch.

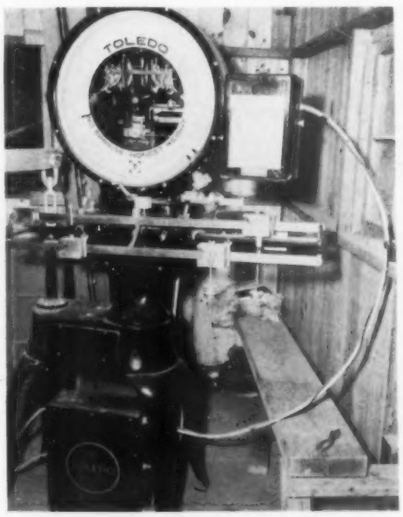
The Type B mass concrete contains 0.93 barrel of cement per cubic yard. The water/cement ratio is 0.61 and the slump is also less than one inch. This concrete has an average strength of 1,700 p.s.i. at 7 days and 3,600 p.s.i. at 28 days.

Two types of concrete are used in the tunnel also, one for the invert and the other for the arch. The arch concrete has 6 bags of cement to the cubic yard and the invert concrete about 5½ bags. Both concretes have the same water/cement ratio, making the arch concrete somewhat wetter because it is more difficult to place.

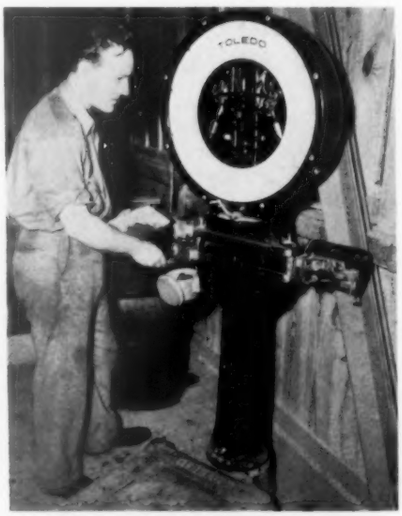
The (SC)² system of control used in these plants is the same as those used in a number of commercial plants, including those of the Koenig Coal & Supply Company, Detroit, Michigan, which were described in the December, 1938, issue of PIT AND QUARRY. The control begins at the aggregate plant, where the gradation and soundness of the aggregates are tested at intervals. Frequent tests are made of the specific gravity, that of the sand averaging about 2.70 and that of the gravel about 2.68. (SC)² supplies a technician for each of the concrete plants on this job. In a commercial plant a technician is supplied for 30 to 60 days to teach the testing and control methods to a company employee.

On the batching floor of each of the concrete plants is a Toledo (SC)² moisture-meter scale which is calibrated up to 6 pounds in hundredths of a pound. Moisture tests of the aggregates are made every 15 minutes, and oftener if any great variation is found. In earlier installations this scale was used to test 2-pound samples of sand or coarse aggregate. These improved scales test 2-pound samples of sand but 4-pound tests of gravel are made in order to obtain a more representative sample. For

(Continued on page 73)



A closeup of the batcher scale and graphic recorder at the tunnel plant.



The moisture-determination scale in use at the tunnel plant.

The CONCRETE MANUFACTURER

Faber-Made Blocks Win Well-Deserved Reputation Over Twenty-Year Period

A view of the plant showing dump truck discharging a load of cinders.

THE old saw about the better mousetrap has been pretty well worn out but it might be applied to the Faber Cement Block Company, Inc., of Paramus, New Jersey. This company has never employed a salesman and has never advertised. The quality of its products brings in orders in constantly-increasing volume and to an extent that recently made it necessary for the company to build a new and larger plant and then to enlarge this plant. Even now blocks are being sold faster than they can be made and stocks on hand are at an all-time low.

The new plant is on New Jersey State Highway No. 2, a 4-lane pavement which is a main north-and-south artery on the west bank of the Hudson River opposite New York City. The plant presents an unusually neat and attractive appearance which in itself is good advertising. Unlike many other concrete-block plants, it is built of concrete blocks.

The Faber Cement Block Company was formed in 1919 with Gerhardt Faber as president and Albert J. Faber as secretary and treasurer. In the original plant in Ridgewood, New Jersey blocks were hand tamped in wooden molds. Later Anchor strippers with Anchor floor-type tampers were installed and these were followed by Anchor power strippers. Late in 1938 a Stearns power stripper was being used when the need for more capacity became apparent. The new plant went into operation on January 10, 1939, nine weeks after construction was begun. The Stearns stripper was moved in from the old plant and one Joltcrete machine was installed. The second Joltcrete machine was installed in 1940.

Two types of blocks are made—cinder-sand and sand-cinder, in place of the usual straight sand or cinder blocks. The cinder-sand block is the biggest seller and it is made with enough sand in the cinders, about 15 per cent. by volume, to fill all the voids and give a stronger and more moisture-resistant block. About 25 per cent. of cinders added to the sand block cuts down the weight and makes a drier block which will not sweat. A standard 8- by 8- by 16-inch cinder-sand block weighs 32 pounds and the sand-cinder block weighs 40 pounds. Each has a strength of from 1,000 to 1,200 pounds per square inch. All the blocks have a trade-mark so that the maker can be identified at any time.

The vibrating machines are used chiefly to make standard 8- and 10-inch blocks and the stripper to make 4- and 6-inch blocks and specials. Chimney blocks are made on an old Multiplex hand-operated machine. Each of the vibrating machines makes from 3,800 to 4,000 of the 8-inch blocks or about 3,000 of the 10-inch blocks daily. In 1940 one of these machines made 953-806 of the 8-inch and 82,000 of the 10-inch blocks. It is estimated that their combined production this year will be well over two million blocks.

The hard-coal cinders which are used come from factory boiler plants and contain very little iron or sulphur. The cinders and the sand are brought in by the company's own fleet of trucks which are also used to deliver the blocks. Stock-piles of cinders and sand

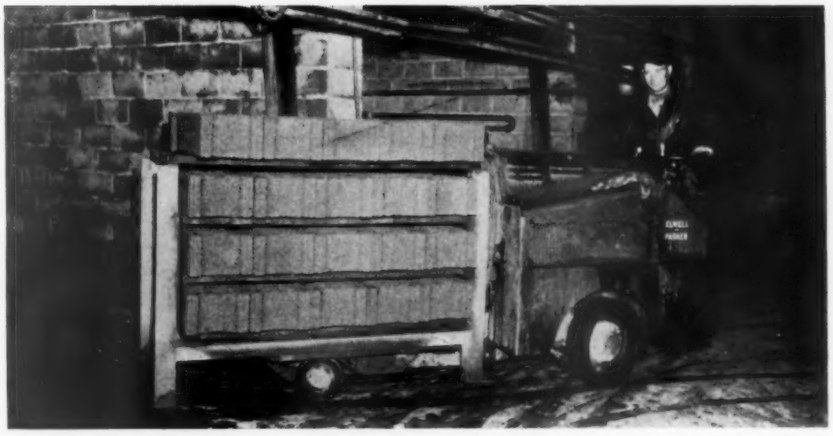
Dumping cement through grating to one of the mixers.

are maintained and an effort is made to keep about 10,000 cubic yards on hand. A Haiss 75-W Special pneumatic-tired, gasoline-powered stock-pile loader is used to load trucks from stock-piles for delivery to the plant. This machine has a capacity of 3 cubic yards per minute.

One of the vibration machines in operation.

At the plant the aggregates are discharged from a concrete-block walled, earth-fill ramp into a 40-cubic yard steel hopper. A belt-conveyor is followed by an elevator which feeds these materials to separate compartments of a 50-cubic yard steel bin by means of a split chute. The cinders are discharged over a stationary screen and the oversize goes through a New Holland roll-crusher and back to the elevator. The mixing floor has space for the storage of five carloads of cement.

Roll-crusher for cinders.



Gasoline-powered lift-truck moving blocks from curing room to storage.

The aggregates are discharged from the bins through Heltzel gates into a traveling volume batcher, which feeds the two 21-cubic foot Blystone concrete mixers. The mixers are covered with safety gratings through which the aggregates and cement are discharged, the latter from sacks. One of the mixers serves a Stearns Joltcrete vibrating block machine. The other serves the second Joltcrete machine and the Stearns power stripper.

Two men operate the mixers, and two work on each block machine, one carrying away green blocks with a hand-lift truck. The curing is done in 6 concrete-block-walled kilns with a capacity of 1,500 blocks each. These kilns are open only at one end and have folding steel doors. The use of cored pallets results in efficient steam curing and the blocks can be moved out of the kilns after 5 hours, although they are usually cured for 12 hours. An Elwell-Parker gasoline lift truck is used to move blocks from the kilns to two curing sheds which have a combined capacity of 100,000 blocks or to outdoor storage. These sheds are especially convenient for loading out blocks on rainy days or in winter and more of them are to be built. The gasoline lift truck is also used to bring empty racks back to the plant. A 35-horsepower oil-fired boiler supplies steam for the kiln.

Loader filling a truck at the cinder stock-pile.

Stripper which ordinarily makes the special sizes of blocks required.

Most of the company's sales are made within a distance of 50 to 70 miles from the plant. Deliveries are made by the company's fleet of six 2- to 70-ton White trucks, of which three have dump bodies and three have flat bodies. One of the dump trucks has a 2-ton body which is convertible to a flat body; all are equipped with Gar Wood bodies and hydraulic hoists. During rush periods some trucks are hired and there are some dealers in New York City who send their own trucks to the plant.

The prevailing price in this area is 11 cents for a standard 8-inch block delivered within a 10-mile radius. For greater distances an additional charge is made.

Most of the blocks made are used for residential construction, for back-up work, partitions, etc. About 98 per cent. of the cellars in this area are made of blocks. Some exterior walls are also built of blocks and are covered with plaster or stucco.

This plant has for the past 3 or 4 years been supplying all the blocks for the expansion of the Curtiss-Wright and Wright Aeronautical Corporation plants at Paterson and Caldwell, New Jersey, where aëroplane propellers and engines are being made. Cinder blocks are being used exclusively in these huge expansion programs. Blocks are also being supplied to four housing projects, two of which are for defense workers.

The CONCRETE MANUFACTURER

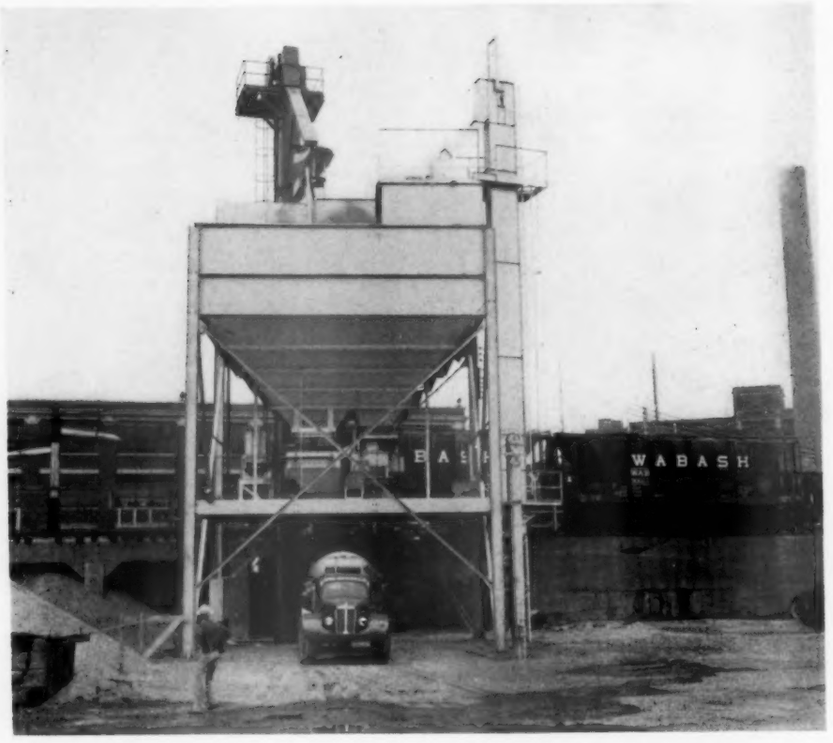
Pioneer Ready-Mix Concern Erects a New Plant

By HARRY F. UTLEY

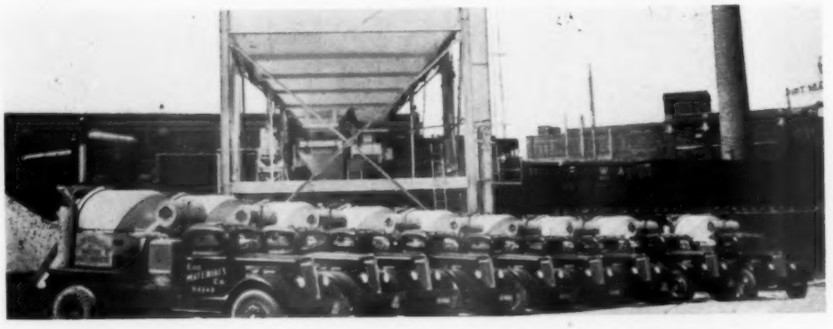
IN Fort Wayne, Indiana the name, Erie Materials Company, has been synonymous with ready-mixed-concrete for more than a decade. This company was one of the middle-western pioneers of mixing in transit. It still has some of its old Paris-type mixer bodies in the garage which it presses into service on occasion. A subsidiary of the Erie Stone Company of Indianapolis for many years, the ready-mixed-concrete concern was acquired early in 1941 by a Fort Wayne group. The original name and location have been retained; otherwise the company and its plant, equipment and personnel are new.

On March 1 the work of erecting the new all-steel Butler batching and bulk-cement plant was begun and on May 15 the first load of concrete was batched and delivered. Nine new truck-mixers were put in operation as the production of concrete got under way and in July four more were added. All 13 are 3-cubic yard Smith-Mobiles on White chassis.

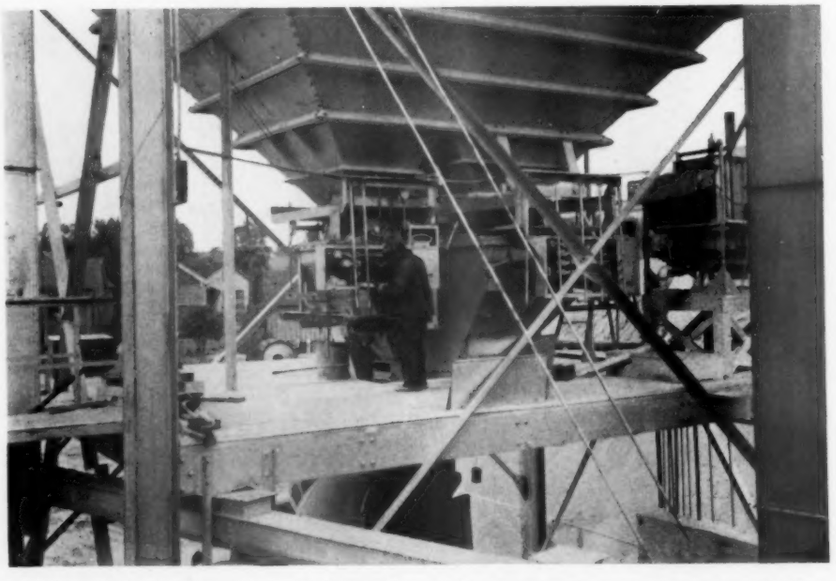
Aggregates are received by railway and are dumped on stock-piles. Beneath these storage piles is a concrete reclaiming tunnel equipped with 18 duplex gates for admitting the required sizes of aggregates. These drop on a 24-inch Goodyear belt 150 feet long on centers. The sand or gravel is discharged over grizzly bars to the boot of an inclosed bucket-elevator. A swinging spout at the top of the plant, controlled by a selector wheel from the batching floor, distributes the aggregates to either of four compartments. The bin has a total capacity of 316 tons and is divided into six compartments,



A general view of the plant with two bulk-cement cars on the track.



The truck-mixer fleet. When the picture was taken 9 were in service. Now there are 13.



A view of the batching floor showing, left to right, the cement- and aggregates-weighing batchers and the water scale.

tour for aggregates with a combined capacity of 196 cubic yards and two for cement with a capacity of 120 cubic yards. There is provision for adding a partition in the bin to make a fifth compartment for aggregates if this should become necessary.

Bulk cement arrives in covered hopper cars over the Wabash Railway. The tracks are elevated 12 or 15 feet above the level of the ground on which the plant is located. A horizontal 9-inch screw-conveyor and bucket-elevator carry the cement to the storage compartments at the rate of about 200 barrels hourly. The operator on the batching floor also controls the feed of cement from the cars to the plant. A

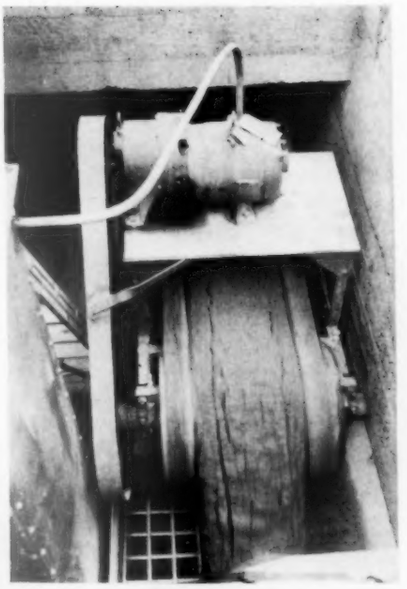
One of the truck-mixers being charged.

special double-chain elevator for handling sacked cement is also installed alongside the plant for special cements, or in the event it should ever become necessary, because of a car shortage or for some other reason, to bring in the regular cement supply by trucks.

The aggregates and cement are weighed out by means of separate 3-cubic yard batchers. The aggregate batcher is equipped with four 9,000-pound beams and has provision for a fifth. The cement batcher has a tare beam, one 2,000-pound beam and provision for adding a third beam. The aggregate batcher is equipped with a clamshell-type discharge gate and the cement batcher a wringer-type discharge gate. On the batching platform is a 125-gallon water scale with an automatic filling valve and a manual discharge valve.

Below the batcher is a collecting neck to gather the materials together, and a telescoping rubber discharge hose. Thus, a truck-mixer need make only one stop beneath the plant; the telescoping hose is lowered into the drum, the entire batch discharged and the truck drives away with little time spent for charging.

The plant proper, including the batching equipment, was supplied by the Butler Bin Company, while the elevators and tunnel conveyor were



Tunnel reclaiming conveyor discharging aggregates into boot of elevator.

furnished by the Columbus Conveyor Company.

About the time the plant started operating the United States Army began work on Baer Field, a huge aviation-training project for embryo pilots. Much of the concrete for the structures being erected there is being supplied by the Erie concern. There is considerable industrial building in progress in Fort Wayne also, including a $50,000,000 aviation-engine plant to be operated by the Studebaker Corporation for the government. This has, in turn, stimulated residential building so the company has launched its business in a year that bids fair to top any other in Fort Wayne's history so far as the use of concrete is concerned.

The new company is headed by W. J. Fishering. Robert W. Fisher is plant manager.

Bridgeport *(from page 69)*

each test a container of known weight and volume is suspended from a beam on this dial scale and a dial segment is set for the correct specific gravity. The container is then filled with this material until the indicator points to this mark on the dial. The container is then removed from the beam, filled with water, and shaken until all the air bubbles have been removed. The container is then again suspended from the scale beam and the moisture content of the aggregate is read direct from another small dial segment.

This scale also has a platform for heavier weighing up to 125 pounds, the weights being indicated on another scale on the dial. This is used to make sieve analyses of the aggregates and can be used for any size up to 125 pounds but for 2-, 5-, 42- or 100-pound samples the percentage of a sample retained on any sieve can be read directly from the scale.

In weighing out a batch of concrete the counterpoise on the sand beam of the Toledo (SC)[2] batcher scale is first set at the desired dry-sand weight. The correct number of percentage weights is then added to compensate for the moisture content. The sand is then weighed out. The counterpoise on the coarse-aggregate beam is then set at the desired total weight for all the coarse aggregates to be used and the correct moisture percentage weights are appended. The coarse aggregates are then weighed out. If more than one size of coarse aggregate is used they are weighed out consecutively by setting movable pointers on the rim of the scale dial.

The poise on the cement beam is then set and the desired amount of cement is weighed out.

The poise on the water beam is next set at the predetermined total-water-content weight. The percentage weights are then removed from the sand and coarse-aggregate beams to subtract the contained moisture from the total water weight. The water is then turned on and is shut off automatically at the desired weight. While this procedure sounds complicated, trained operators can weigh out a batch as quickly as it can be done in an ordinary batching plant. The scale is suspended from the bin structure to reduce vibration.

Each day two sets of standard 6- by 12-inch concrete cylinders are made at each plant. These are broken at 7 and 28 days. Additional cylinders are made at intervals and are broken at 60 and 90 days and at one year. When cylinders are made of the mass dam concrete all the aggregate over 1½ inches in size is first screened out. On this job the cylinders are broken by a Watson-Stillman 200,000-pound compression-testing machine at a small laboratory near the dam.

Truck-Mixer Standards Ready for Adoption

The National Ready Mixed Concrete Association has approved, subject to vote by the membership, of eliminating the word "tentative" from its *Tentative Standards for Operation of Truck Mixers and Agitators.*

Section 1-b of the standards has also been revised to read as follows: "These standards and recommended practices are based on the ability of the equipment to mix and/or transport concrete in an acceptable manner from the point of view of quality. They are subject to periodic revision as further studies justify such revision."

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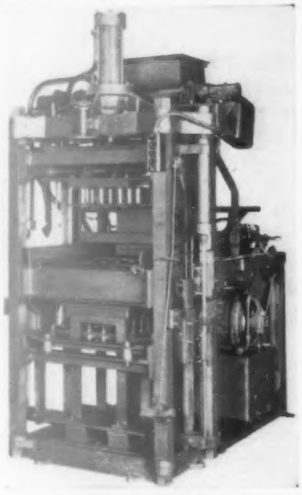

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THE COMMERCIAL SHEARING AND STAMPING CO.
YOUNGSTOWN, OHIO

Lift-Truck *(from page 66)*

an average of 150 tons gross load from the concrete apron to the storage piles and, in addition, returns all empty racks and pallets to the concrete apron.

The tractor is a stock model Ford which comes equipped with a built-in hydraulic lifting device. This hydraulic device was designed for the purpose of setting and maintaining the depth of the furrow when the tractor is used to draw a plow. The lifting arms have a travel of approximately 11 inches and the hoist is so designed that any load in excess of 1,600 pounds at the end of the lifting arms will cause a release valve to open, by-passing the oil and thus obviating the possibility of overloading the hoist.

The tractor being designed to lift not more than 1,600 pounds not more than 11 inches, it became necessary to find a way of causing it to lift 2,605 pounds not less than 7 inches. The task was accomplished by passing cables from the lifting arms down through fixed pulleys below, then forward and over fixed pulleys mounted above the front axle thence to the movable frame of the lift. The movable frame was hinged by shafts at the top of four legs which are, in turn, similarly hinged at their lower end to a fixed frame. The legs are 12 inches from center to center where hinged. The jack-lift has a rise of about 8½ inches.

A counterweight of about 900 pounds is carried on the rear of the fixed frame mounted under the tractor. In addition to this weight the load is further counterbalanced by carrying 35 gallons of calcium-chloride solution (to prevent freezing in winter) in each of the rear tires. It will be noted that the regular tractor wheels were replaced with Ford passenger-car wheels on which were mounted 6:50 by 18 heavy-duty tires and tubes inflated to 68 pounds.

The idea of converting the Ford tractor to our needs was entirely our own as were the original drawings for its conversion. With the able assistance and advice of the Rockville Motor Company, local Ford distributors, the plans were slightly revised and construction intrusted to their care.

Our tractor has performed splendidly with no mechanical trouble. It carries its load up hill and down, over comparatively rough ground, without injury to the racks or units. It is maneuverable to a surprising degree, turning in its own length without backing. It will raise and lower a loaded rack in 10 seconds. All operations are controlled from the driver's seat. The tractor has frequently handled 120 loaded racks, carrying them in excess of 150 yards and returning a like number of empty racks, all in 6 hours.

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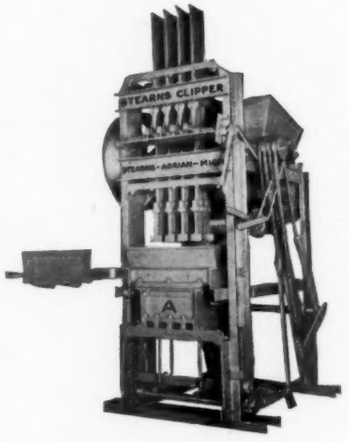

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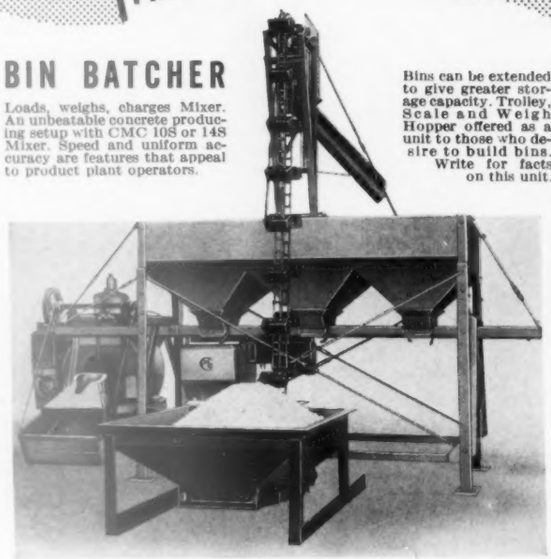

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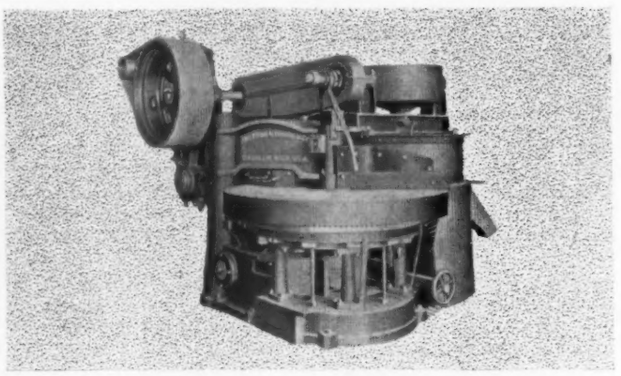
CONSTRUCTION MACHINERY COMPANY
WATERLOO, IOWA

"It's really a BRICK!"

THE "J & C" PRESS

makes *better* Concrete Brick



Users say that they can make high quality concrete brick *faster* and *cheaper* on a "J & C" automatic machine.

All brick are accurately sized—have clean, uniform edges—are smooth textured, and high in strength.

Brick can be produced either vapor cured or high pressure cured. High pressure steam curing eliminates expense of yard stocking and aging. NO PALLETS USED.

Capacity of "J & C" Model "A" Machine, 3200 brick per hour. Capacity of Model "C" Machine, 1600 brick per hour.

Write for Information.

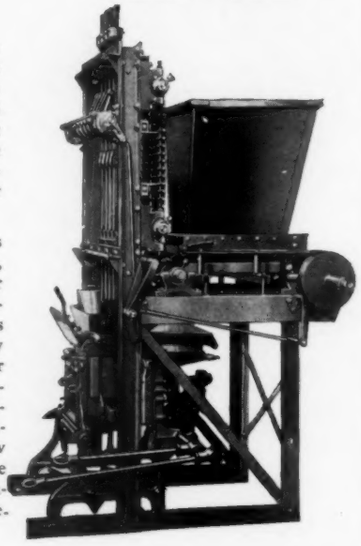
THE JACKSON & CHURCH CO.
Saginaw, Michigan

Miles CONCRETE EQUIPMENT

simple as A B C

It isn't how MUCH you invest that counts, but WHAT YOU EARN on your investment. MILES Concrete Products Plant Equipment will insure increased output, at lower first cost and lower operating cost.

MILES equipment is simple in construction, yet ruggedly built for the severest kind of service. Expert mechanics are unnecessary . . . any workman can keep your MILES equipment operating in first-class condition at all times. Investigate! Get the facts now . . write for a complete catalog of MILES machinery for the concrete-products plant.



MILES MANUFACTURING CO.
JACKSON, MICHIGAN

THE ORIGINAL DEMPSTER DUMPSTER BUCKETRUX

Drop Bottom Bucket in Carrying Position

Our entire organization, and plant, is exerting its complete effort in and for the National Defense Program.

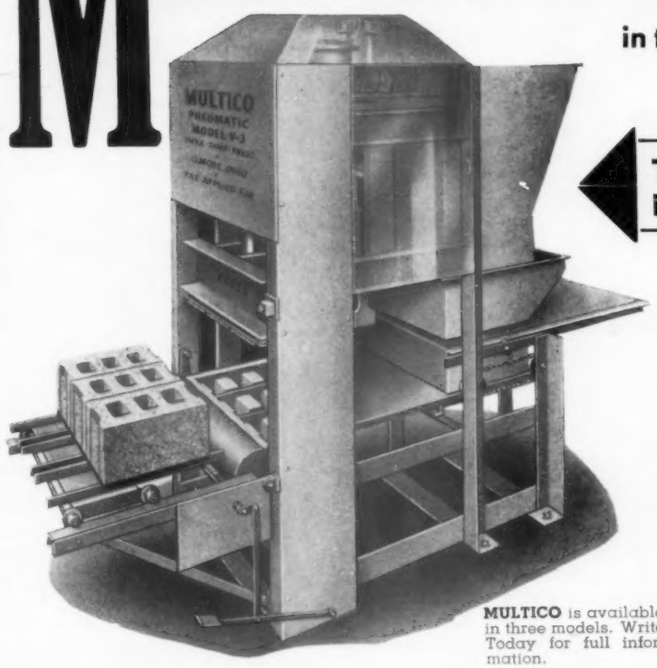
We suggest that for operations where any materials are being furnished for defense work, and where efficiency can result in the reduction of hauling costs as much as 50%, that such plants follow the example set by many of the world's largest producers and install DEMPSTER-DUMPSTER-BUCKETRUX, the hauling unit with a multiplicity of detachable bodies.

Write for Information—Our Sales Engineers Will Serve You.

DEMPSTER BROTHERS, Inc.
Knoxville Tennessee

MULTICO IS MAKING HISTORY

in the Concrete Products Industry



MULTICO is available in three models. Write Today for full information.

THIS NEW BLOCK MACHINE is setting Demand and Profit Records

Concrete producers throughout the industry are according an enthusiastic reception to our new MULTICO Pneumatic Vibrator.

They're keen about its Dual Vibration principle, which vibrates the top of the block, as well as the concrete in the mold box. More effective top and bottom control of vibration timing allows wetter mixes and evener water distribution in the block.

This revolutionary machine combines Vibration, Pressing and Tamping. It assures perfect units of any density or texture. Operates under air pressure or electric current. Requires fewer working parts, and shows sharply lowered operating and upkeep costs.

THE MULTIPLEX CONCRETE MACHINERY CO. ELMORE, OHIO, U. S. A.

NEW **LOW COSTS! in Block Production**

Nothing Equals the Combined VIBRATION and PACKING of

PAK-CRETE

Write TODAY for illustrated folder, details, prices. Compare for yourself.

KRAMER PRODUCTS CO.
Industrial St. Peoria, Illinois

NEED STORAGE ROOM QUICKLY?

● Neff & Fry storage bins can be erected and ready for use within three days . . . giving you needed facilities **quickly.**

Check these features: super-strength, diagonal locking stave construction . . . steel hoop reinforced . . . immediate reaction . . . wide range of sizes . . . all guaranteed . . . easy dismantlement . . . thousands of actual installations to check for unbiased facts.

Write for full details

THE NEFF & FRY COMPANY
Camden, Ohio

QUINN PIPE FORMS

HEAVY DUTY PIPE FORMS

Our Heavy Duty type with Adjustable Locks is shown above. Quinn Heavy Duty Forms are also available with a new wedge-type lock.

HAND or WET PROCESS

Make concrete pipe on the job with Quinn Pipe Forms. They can be handled by less experienced labor and produce uniform concrete pipe of highest quality. Quinn Pipe Forms make pipe conforming to A. S. T. M. requirements as to wall thickness and other standards.

Quinn Heavy Duty Pipe Forms are built to give more years of service — sizes for any diameter pipe from 12 to 84 inches — tongue and groove or bell end pipe — any length. Backed by over 30 years of service in the hands of contractors, municipal departments and pipe manufacturers.

MEDIUM DUTY PIPE FORMS

Meet the demand for low cost equipment that produces a uniform quality of pipe in smaller amounts. For making pipe 12 to 60 inches in diameter —any length.

WRITE TODAY

Get complete information on prices and Special Construction Features of Quinn Pipe Forms. Give us size of job for estimate on your pipe form needs. Also manufacturers of Quinn Concrete Pipe Machines for making pipe by machine process.

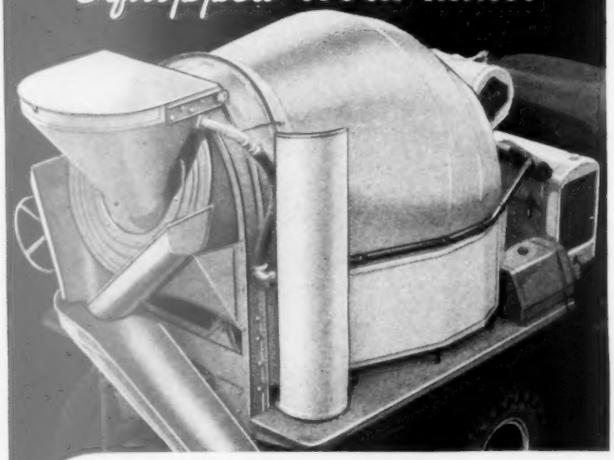
QUINN WIRE & IRON WORKS 1627 12th ST. BOONE, IA.

The CONCRETE MANUFACTURER

Replace Old-Style "HATCH-LOADERS" with this Modern

FEED CHUTE

Equipped Truck Mixer



Only SMITH-MOBILE Provides FAST END LOADING

No longer is it necessary to cope with those troublesome, leaky, time-consuming hatches. Smith-Mobile, with its roomy, streamlined FEED CHUTE, speeds up the charging operation . . . actually saves about two-thirds of the loading time required by old-style truck-mixers. Thoroughly field-tested, Smith-Mobile has already had 5 years' successful operation on jobs all over the country. And it's backed by more than 40 years' concrete mixer building experience. So why gamble with new and untried machines? Avoid imitations! Get the modern Smith-Mobile that's been definitely proven okay. All sizes available. Ask for Catalog No. 198 A.

The T. L. SMITH COMPANY
2887 N. 32nd Street • Milwaukee, Wisconsin

SMITH-MOBILE
THE Modern TRUCK MIXER and AGITATOR

A 3541-½

LOW INITIAL COST
LOW MAINTENANCE COST

ONE OF OUR MANY DESIGNS

Chase "all steel" Block racks are built to suit your individual requirements. Our experience and engineering will give you a rack with the proper dimensions and arrangement for loading your product and the proper under clearance to work with your lift truck.

WRITE for Catalog and Special Low Prices

Complete line of concrete block cars, decks, Lift Truck Racks, transfer cars, turntables, dump cars, etc.

CHASE DRYER CARS & TRANSFER CARS
CHASE FOUNDRY & MFG. CO. COLUMBUS, OHIO

It is better to own a Sherman machine than to compete with one.

SHERMAN'S

Ball Bearing Concrete Pipe Machine, showing the sectional core which is the most economical core. By replacing only one section at a time which is a savings of 75% to the user.

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SHERMAN CONCRETE PIPE CO.
KNOXVILLE, TENN.

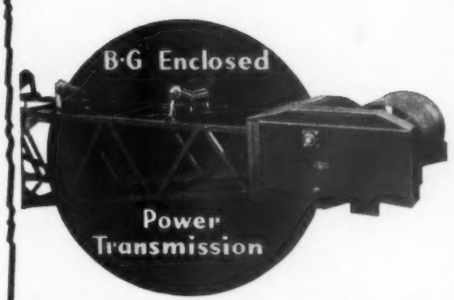
SPOT WELD YOUR MESH!
FOR GREATER STRENGTH

Welding cages with ALLAN Portable Welding Machine

with ALLAN Portable Spot Welder for welding concrete pipe reinforcement. This FAST, EASY, SURE, ECONOMICAL method Reduces the Cost of the product. Write for details

ALLAN MFG. & WELDING CO., Inc.
BUFFALO, NEW YORK

Via Barber-Greenes



B-G Standardized Units include 24" and 42" deep Steel Truss, Enclosed Power Transmission, Head End Drives, Wrap Drives, Various Types of Take-Ups, A Frames, Walkways, etc. All unit parts and assemblies are accurately rated, giving the individuality of a "tailor made" conveyor plus the many additional advantages of standardization.

BELT conveyors offer by far the cheapest means of handling bulk materials. Barber-Greenes offer many additional advantages.

Having Pre-Engineered Standardized Unit Parts and Assemblies, the B-G Sales Engineer is able to make a quicker, more accurate price estimate, the Engineering Department is able to make a quicker, more practical layout.

This B-G Standardization lets us carry the parts in stock for practically any conveyor requirement — giving prompt shipment.

Erection is tremendously speeded up and simplified, and perfect alignment is assured.

B-G Standardization allows the addition of standard accessories later, and Barber-Greene Standardized Sectional Construction permits unequalled change of set-up to meet changing conditions.

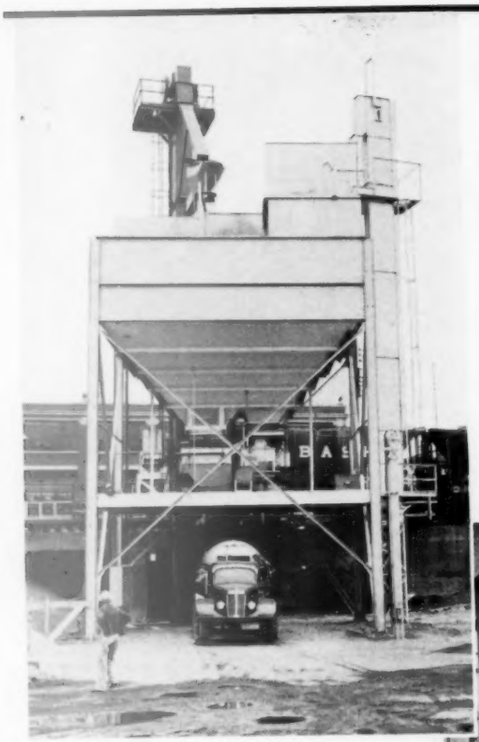
B-G Carriers are recognized for their excellent design and performance records. They are available with plain, ball, or roller bearings. If you are replacing carriers or erecting your own conveyor, investigate B-G Carriers.

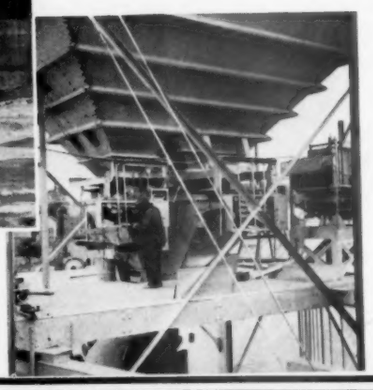
Solving your handling problems is our business.

Standardized Material-Handling Machines

BARBER GREENE

Aurora, Illinois





Above—The Butler-built Erie Materials Co. plant. Right—The batching floor where all controls, including the selector wheel which controls the feed of aggregates to the proper bin compartment, are conveniently arranged.

BUTLER Builds a Plant for Erie

One of the most efficient concrete batching plants erected in 1941 is that of the Erie Materials Co. of Fort Wayne, Ind. This all-steel BUTLER-Built plant has a 316-yard bin with four compartments for aggregates and two for cement. Aggregates and cement are weighed out by separate 3-yard batchers and water is automatically supplied by a Butler tank and scale. A collecting neck beneath the batchers and a telescoping rubber discharge hose make charging of the truck-mixers a fast, one-stop operation. Whatever your requirements, there is a BUTLER plant to fit the job. Write for complete details.

Butler Bin Co.
Waukesha, Wisconsin

How Sumpter Solves HIGH PRICES AND MATERIAL SHORTAGES

Are the builders in your community hampered by delays, rising material prices, uncertain quality? Mr. W. A. Sumpter solved these problems by producing better, lower cost building materials from locally obtained aggregate.

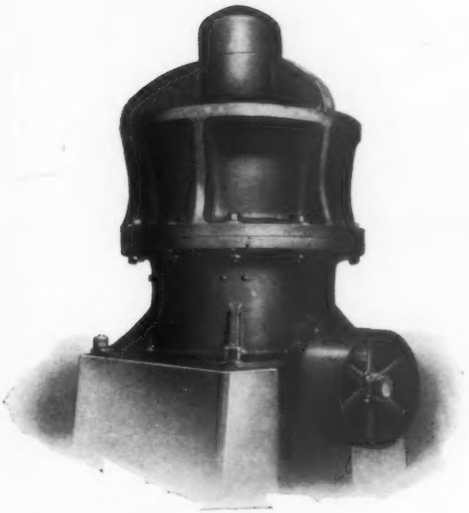
He makes DUNBRIK a lighter weight, lower cost brick of greater strength, lower absorption, and DUNSTONE a double and triple brick that enables him to build fire and vermin proof walls at cost level of frame.

Mr. Producer: You, too, can solve these problems for the building industry in your locality. You use your surplus or waste aggregate and make products in a range of over 40 beautiful colors, shades and textures.

Many producers like Gravel Products, Consolidated Quarries, Chandler Materials, C. L. Nelson Co., and others are now supplying some of today's largest Defense jobs with millions of DUNBRIK and DUNSTONE. We will equip you with a modern line production plant that can be operated with a small crew.

Modest investment starts you. Terms can be arranged, and your territory will be protected by franchise. Write or wire today for free books that tell the complete story.

W. E. DUNN MFG. CO.
420 W. 24th St. Holland, Michigan



the TRAYLOR TYPE TY REDUCTION CRUSHER

—the sure road to low cost production!

When an operator buys a crusher and ADDS one or two or three like it, at as many different times, it's a sure bet he finds that they give him the one thing he's in business for—PROFITS. This "MORE OF THE SAME" has happened many times with the Traylor Type TY Reduction Crusher and is the reason for its phenomenal success.

Except for VERY FINE product (our Multi-Stage takes care of that), the TY will do any reduction work, in any quantity, that any operator may desire—masterfully and economically. Use it, and your plant will be more flexible and efficient!

INVESTIGATE OUR TYPE H BLAKE CRUSHER (BULLETIN 1105), AND OUR MULTI-STAGE FINE REDUCTION CRUSHER—(BULLETIN 113).

SEE BULLETIN 3112

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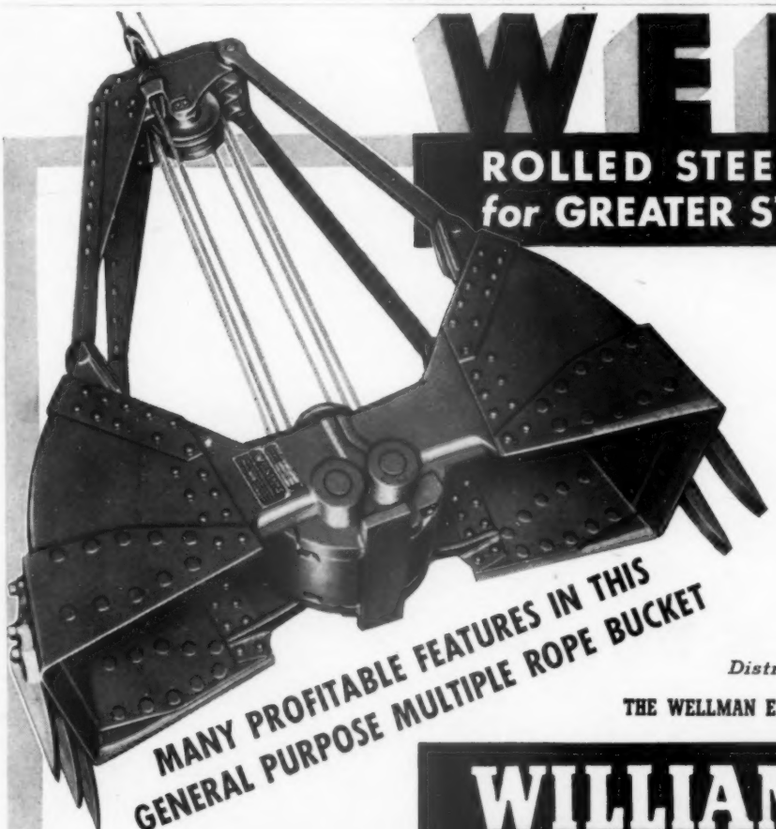

WELDED

ROLLED STEEL CONSTRUCTION for GREATER STRENGTH and SPEED

MANY PROFITABLE FEATURES IN THIS GENERAL PURPOSE MULTIPLE ROPE BUCKET

Lower Head Room

L-O-N-G-E-R R-E-A-C-H

Welded Construction insures longer wear—less breakage. Cutting down unnecessary weight means faster work—more yardage. Williams sheave arrangement keeps leads straight, less friction and fraying—longer cable life. Sheaves protected against contact with bucket load, open end sheave block prevents clogging.

Bulletin describing each type of Williams Bucket FREE on request.

Distributors in all parts of the country.

THE WELLMAN ENGINEERING CO., 7014 Central Ave., Cleveland, Ohio

WILLIAMS *Buckets*

built by WELLMAN

RESULTS . . . . not promises!

Leadership isn't something that can be promised for, or argued into, a concern . . . or a magazine. Leadership must be earned and won. Pit and Quarry has attained that leadership in its field by giving readers and advertisers alike what they demand in an industrial publication. As a result, Pit and Quarry leads in *total circulation* and *producer circulation* . . . in *advertising volume* and *reader preference.*

Follow a leader . . . subscribe
for . . . advertise in

PIT AND QUARRY

can you tell how far he can jump?

Neither can you tell from looking at Wickwire Rope how much more service it gives than usual high grade wire ropes. Use alone will prove it.

We invite this comparison. Install a Wickwire Rope of the design recommended by our representative. Use it to destruction. Then compare its per-unit-of-use cost with that of any other rope you have ever used. Our bid for your business is based upon your attaining lower rope costs.

While Wickwire Rope is premium quality, its price-per-foot is no more than other recognized brands.

WICKWIRE ROPE

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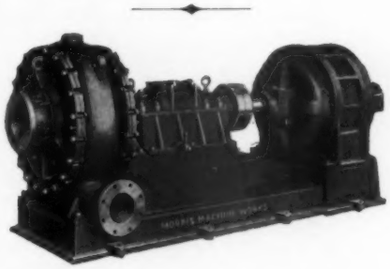
The MORRIS HYDRAULIC COLUMN

News of interest to Centrifugal Pump Users

Dredges that reduce production costs . . . .

The long list of Morris sand and gravel dredge records is full of examples of speedy, economical and trouble-free service, such as twice the expected sand and gravel production, hundreds of thousands of cubic yards of heavy material without repair expense, greater capacity and dredging depth than obtainable with other equipment, etc. Morris Dredges are furnished for any kind of dredging work and for any operating conditions. Write for dredge bulletins.



Pumps that quickly repay their cost . . . . .

The remarkably high efficiencies of present-day Morris pump designs will save 10% or more of the power required by older pumps. Figure for yourself what 10% of your pumping costs amounts to in the course of a year—and then investigate the cost and actual savings of Morris Pumps. Write for pump bulletins.

MEMBER

For authoritative recommendations on any pumping or dredging problems, write to Morris Machine Works, Baldwinsville, N. Y. Representatives in principal localities. Export Office: 50 Church Street, New York.

Mr. Check says:

J&L WIRE ROPE

"J&L PERMASET Pre-formed Wire Rope gives extra service."

JONES & LAUGHLIN STEEL CORPORATION
AMERICAN IRON AND STEEL WORKS • PITTSBURGH, PENNSYLVANIA

DEFENSE *Against* WEAR

This dragline bucket, hard-faced with Coast Metal No. 110 along the entire bottom, lip and knuckles as illustrated, has seen eight months' steady operation in a hot open-hearth slag dump without repair.

Other buckets working under similar abrasive conditions whose wearing parts are not protected with Coast Metal require general overhauling every thirty days . . . need new wear strips, lip, knuckles, etc.

The bucket shown will again be resurfaced with Coast Metals on the parts exposed to the most severe wear at a fraction of the original coating cost and returned to service.

In these times, machinery is precious . . . hard to get. You, too, should forget maintenance worries the "Coast Metal Way." May we be of service?

COAST METALS INC. Canton, O.

FINISH THE JOB

WITH A

BAUGHMAN LIMESTONE SPREADER

Be sure that your production of agricultural limestone is correctly applied. Baughman spreaders will do it. Even distribution of limestone up to 40 ft. width is assured by the spreading action of a specially-designed revolving disc.

The illustration below shows two 7½ ton Baughman MAMMOTH limestone spreaders at work. Notice how the spread is held down to the ground where it belongs and also the width of the spreads. These two machines have spread thousands of tons of lime and are still going strong.

Baughman limestone spreaders are made in models that can be attached to flat or dump trucks. The new, improved MAMMOTH carrier and spreader comes in seven models ranging from 6 to 18 tons. Each model is a self-contained unit with built-in drives and controls.

Write for our literature

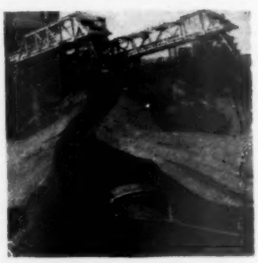
BAUGHMAN MANUFACTURING CO.
Specializing in Spreading Equipment
JERSEYVILLE, ILLINOIS

Here is a 600-ft. span Sauerman Cableway starting deep pit. The excavation shown is two seasons' work totaling 300,000 cu. yd.

DIG, HAUL & DUMP

. . . at lowest cost

Whether your problem is to dig gravel or to convey rock from quarry to crusher, or to stockpile and reclaim your surplus products — there is a size and type of Sauerman Cableway or Sauerman Scraper to meet your needs most economically. Put your problem up to us and we will save you money.



The single Sauerman Drag Scraper shown above handles the open storage of over 150,000 tons of surplus screened materials per year at large gravel plant.

Write for Catalog

SAUERMAN BROS., INC.
434 S. Clinton St., Chicago

SAUERMAN LONG RANGE MACHINES

BEST FOR "CATS"

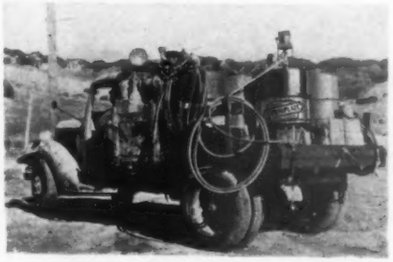
SAY PIOMBO BROTHERS, SAN FRANCISCO, CALIF., CONTRACTORS

"During the many years that Piombo Bros. & Company have been in the contracting and construction business in the San Francisco Bay area, we have never found a lubricant that would begin to compare with LUBRIPLATE No. 30 for application to our Caterpillar tractors and other construction machinery.

"During a recent large highway job where we had seven of our Caterpillar tractors in service, LUBRIPLATE had an excellent opportunity to show up its real efficiency in transmissions, final drives and track rolls.

"LUBRIPLATE No. 30 has given us such excellent satisfaction, that we are indeed pleased to recommend its use in Caterpillar tractors."

(Signed) L. PIOMBO



Piombo Bros. lubrication truck carries LUBRIPLATE lubricants in convenient dispensing drums. Resistance to wear, heat and moisture makes LUBRIPLATE lubricants last longer.

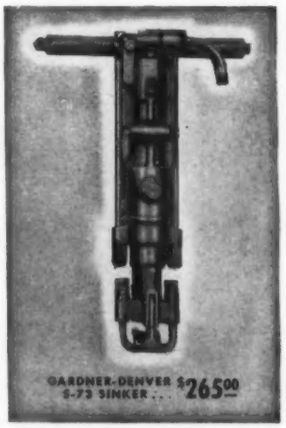
YOU TRY IT Best for "cats" and every use. There's a LUBRIPLATE lubricant for every job. Our field engineer will be glad to call and give you complete information as to how LUBRIPLATE can save you money. Try it.

LUBRIPLATE DIVISION
FISKE BROTHERS REFINING CO.
NEWARK, N. J. TOLEDO, OHIO

DEALERS FROM COAST TO COAST

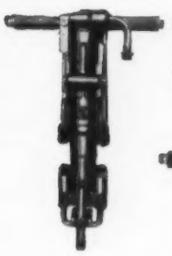
LUBRIPLATE
THE MODERN LUBRICANT
THAT ARRESTS PROGRESSIVE WEAR

"LOOK WHAT YOU GET FOR $65.00 MORE!"



"Your conditions, Mr. Smith, call for a sinker that is able to drill deeper holes in harder ground, without the handicap of more weight than can be conveniently handled in rough country. That's why I suggest this Gardner-Denver S-73 Sinking Drill. It sells for $265—only $65.00 more than the lighter Gardner-Denver S-55 Sinker."

Gardner-Denver S-55 Sinker—speed, balanced performance and low maintenance have made this 55-pound drill famous—$200.00.



Gardner-Denver S-45 Sinker—a 45-pound sinker that will handle steel up to 12 ft. in length—$190.00.

Gardner-Denver S-33 Sinker, a light-weight drill with outstanding speed and reliability—$165.00.

GARDNER-DENVER has a sinking drill for *every* need and condition. In the above case, the S-73 was recommended in preference to the S-55, the famous Gardner-Denver 55-pound drill which has established an enviable reputation. The S-73 handles 18 ft. steels as easily as it handles a starter. At the same time, it uses no more air than the average 55-pound drill.

In the complete Gardner-Denver Sinker line, there is a sinker exactly fitted to your type of work and your conditions. For information, write Gardner-Denver Company, Quincy, Ill.

GARDNER-DENVER

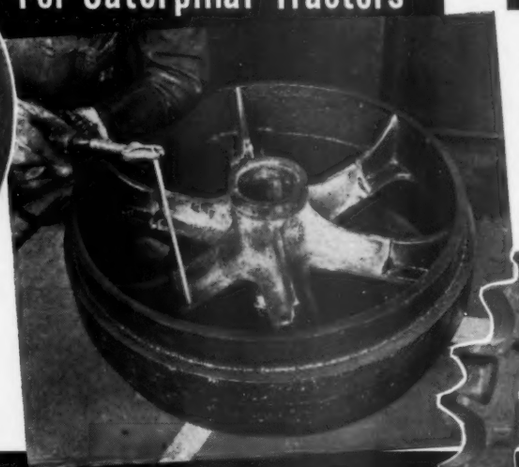
Since 1859

DURABLE MANGANESE STEEL

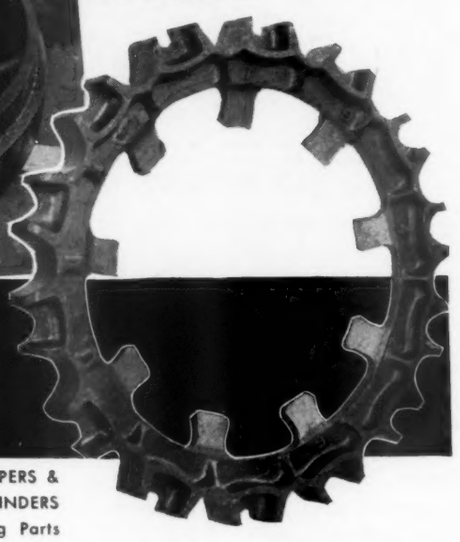
TRACTOR RIMS

Renewable

For Caterpillar Tractors



When only the rims of those tractor drive sprockets and idlers have worn down, you'll save by welding on manganese steel renewable rims . . . They cost much less than the complete part and they're specially adapted for resisting destructive abrasive wear.



They Last Longer
They Cost Less

Alloy Steel & Metals Co.

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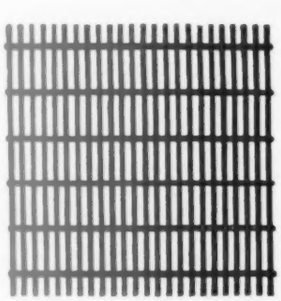
Manufacturers of PACIFIC CRUSHING & SCREENING UNITS • PACIFIC SLUSHING SCRAPERS & SHEAVE BLOCKS • Alloy-Manganese CRUSHER JAWS & MILL LINERS • PACIFIC ROCK BIT GRINDERS HAND WINCHES • CRAWLER SHOES, SPROCKET RIMS and Other Machinery Wearing Parts



Rolled Slot

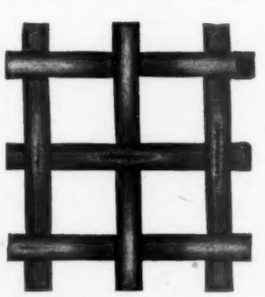
ALLOY No. 2

A super wearing Steel developed to resist the abrasion and vibration of modern screening demands.

"CLEVELAND" SCREENS

A wire cloth of guaranteed accuracy backed by fine workmanship and an effort to satisfy.

Available in Square Mesh and Rolled Slot. A trial will convince you of the superiority.



2 Mesh .162 Ga.

THE CLEVELAND WIRE CLOTH & MFG. COMPANY
574 E. 78th St. CLEVELAND, OHIO

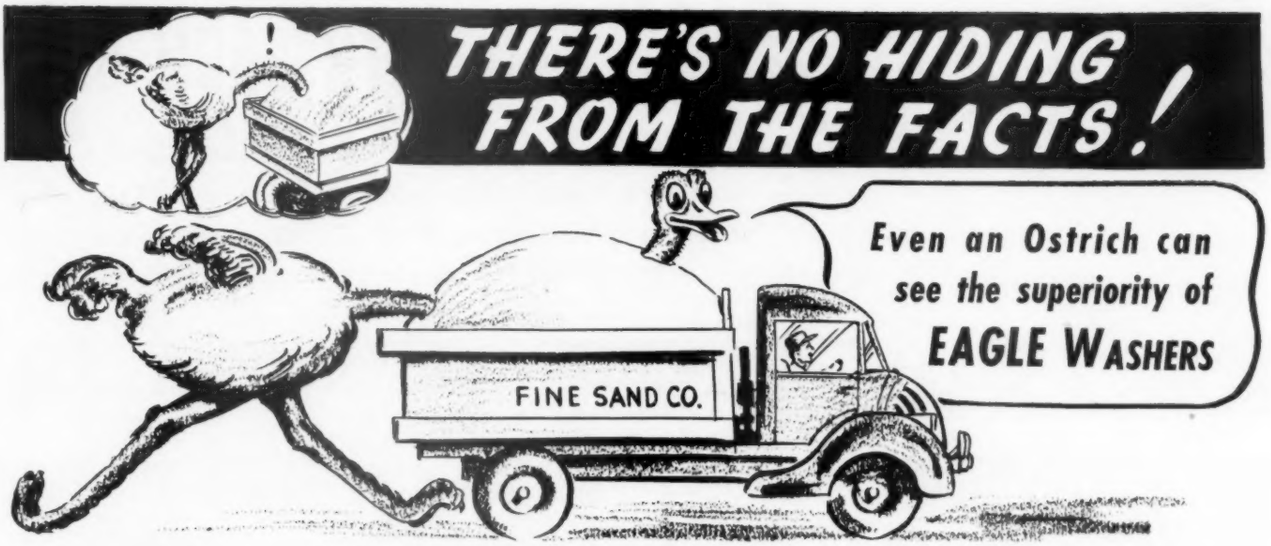
MILLVILLE IRON WORKS, Inc.

SAND DREDGES
DREDGING PUMPS
STEAM COIL DRYERS
ROTOR DRYERS
GRAVEL SCREENING PLANTS

MILLVILLE, N. J.

HENDRICK MANUFACTURING CO.
39 Dundaff Street, Carbondale, Pa.
Sales Offices in Principal Cities. Please Consult Telephone Directory

THERE'S NO HIDING FROM THE FACTS!



Even an Ostrich can see the superiority of **EAGLE WASHERS**

Here is one bird who breaks down and admits that sand and gravel producers who haven't installed EAGLE equipment "just ain't seen *nothin'* yet" for all round performance.

Finely designed and built machines that operate at an extremely low cost over a long service life . . . record production figures . . . high quality material meeting all specifications . . . are features of EAGLE Washers and Dewaterers that command the attention of discerning operators everywhere.

ONCE YOU SEE AN "EAGLE" WORKING, you will want complete information about the famous Eagle line, which includes Eagle Grinders, Eagle Double Roll Crushers, Eagle Dry and Wet Pans, "Swintek" Screen Nozzle Ladders, Olsen Self-Dumping Cages, Specialized Mining Equipment.

Write for our new Bulletin No. 41

EAGLE IRON WORKS
Des Moines, Iowa

For a Fresh Start STOP at a HOTEL

AMERICAN HOTEL ASSOCIATION
AHA

More than 5000 hotels on the continent and in nearby territories, representing the seventh largest industry, allied for service and progress.

AMERICAN HOTEL ASSOCIATION

Men Like to Handle

UNION-FORMED

Being PRE-FORMED, each wire is relaxed to fit so that it does not unravel when cut from reel even though it is not seized. Being UNION-FORMED, it is easier and safer to handle.

UNION WIRE ROPE CORPORATION
2132 Manchester Ave. Kansas City, Mo.
Tulsa • Houston • Chicago • Salt Lake City
New Orleans • Monahans • Portland • Ashland, Ky.

UNION Wire Ropes

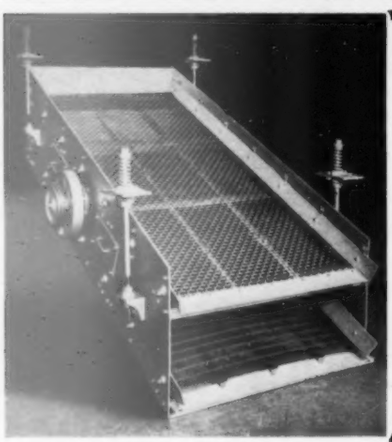
The **"ULTIMATE LOW COST WIRE ROPE"**

A BIG *full* LOAD WITH EACH BITE

Because of their design and construction, Industrial Brownhoist clamshell buckets take extremely full loads with each bite, practically eliminate the need for hand shoveling, speed up material handling and cut handling costs. Quantity production plus our manufacturer-direct-to-you policy reduces your bucket investment. Write today.

INDUSTRIAL BROWNHOIST BUCKETS

INDUSTRIAL BROWNHOIST CORP., BAY CITY, MICHIGAN • DISTRICT OFFICES: NEW YORK, PHILADELPHIA, PITTSBURGH, CLEVELAND, CHICAGO



DENVER - DILLON Vibrating Screen

☆

The Denver-Dillon Vibrating Screen has been proved by over four years of service in numerous industries. Operators report definite reduction in screening costs. "Floating circle" principle requires less than half of the average power of other means of screening. Write today for new Bulletin No. 83-B3.

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1400 Seventeenth St.
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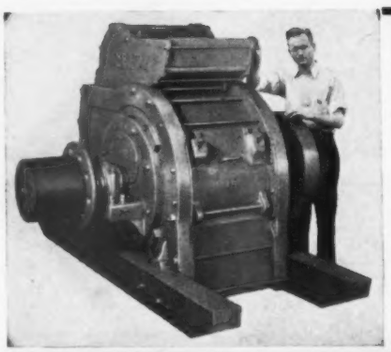
New York, N. Y., 50 Church St. Salt Lake, Utah, McIntyre Bldg. Chicago, Ill., 1005, 69 W. Wash. Toronto, Ont., 45 Richmond St. Mexico, D. F., Boker Building



W-I-D-E

Crushing Range of DAY Swing Hammer Pulverizers

...makes one machine serve the purpose of two or more other types of crushers. The toughest crushing jobs are "All in a DAY'S work."

Write for Bulletin.

Brooks EQUIPMENT & MFG. CO. KNOXVILLE, TENNESSEE

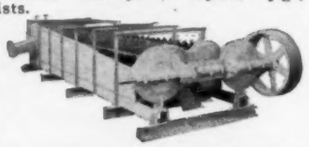
McLANAHAN EQUIPMENT

CRUSHERS

Single and double roll and jaw crushers, hammer mills, super dry pans—steel log washers and scrubbers, sand drags, revolving and vibrating screens, elevators, conveyors, dryers, jigs, hoists.

SCREENS

Complete portable, semi-portable and stationary crushing, screening and washing plants for different capacities of any materials.



McLanahan & Stone Corp. *Established 1835* HOLLIDAYSBURG, PENNSYLVANIA

Lewistown Foundry Products ARE

Performance-Tested

BUCKET ELEVATORS
REVOLVING SCREENS
CRUSHERS DRY PANS

Lewistown Foundry & Machine Co.
Lewistown, Pa.

ROTARY KILNS
GRINDING MACHINERY

for cement, lime, ores, etc.

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F. L. SMIDTH & CO.

60 East 42nd Street New York, N. Y.

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FIRST SOURCE—FIRST CHOICE

FOR A

COMPLETE LINE OF PRODUCTS

Chains	Idlers	Pulverizers
Conveyors	Screens	Portables
Elevators	Crushers	Dryers
Feeders	Grinders	Coolers
Car Pullers		Mono-veyor systems
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THE JEFFREY MANUFACTURING CO.
917-99 North Fourth Street, Columbus, Ohio

Baltimore	Cincinnati	Huntington	Scranton
Birmingham	Cleveland	Milwaukee	St. Louis
Boston	Denver	New York	Salt Lake City
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OSGOOD

TYPE 80 AIR CONTROL

The leader of them ALL for smooth, fast and efficient shovel, dragline or crane operation.

We have a brand new catalog awaiting your request.

THE OSGOOD COMPANY
MARION, OHIO

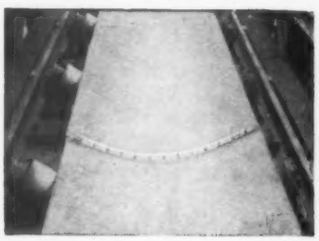
ROBINS *Gives You*

Robins uses the best materials and doesn't skimp on quality of workmanship. Robins Triple Grease Seals keep grease in and dust out. Pulley assemblies are identical, interchangeable, reversible. "One-Shot" lubrication fills all bearing chambers from either side—no dangerous reaching under the belt or loose grease pipes.

ROBINS CONVEYING BELT COMPANY
PASSAIC, NEW JERSEY

Talcott Belt Fasteners

FOR CONVEYOR ELEVATOR AND TRANSMISSION BELTING



BELT MAN LUKE *Says:*

for SAFETY STRENGTH and ECONOMY Insist on TALCOTT the EASY FASTENER TO APPLY

Send for Samples

W. O. & M. W. TALCOTT, Inc.
92 SABIN ST., PROVIDENCE, R. I.

AMERICAN Crushers

Get top tonnages, *continuously*, with AMERICAN Crushers, built to deliver a high volume of product at low cost per ton. Rugged construction means long life, too. Manganese and other tough alloy steels, used in the right places, assure this. Capacities one to 100 tons per hour. Ask any experienced operator, or write us direct for all the facts.

AMERICAN PULVERIZER CO.
1059 Macklind Ave.
St. Louis, Mo.

for AMERICAN Industry

IMMEDIATE SHIPMENT IS IMPORTANT TODAY

OLIVER FILTERS

1—Oliver Rotary Continuous Filters, 8'x10', wood stave, coned steel head, steel trough, oscillating agitator, reduction gear drive, no motor, complete with receivers, pumps.

GYRATORY CRUSHERS

1—16" Telsmith No. 7.
1—30" Superior McCully.
1—20" Superior McCully.

GYRATORY REDUCTION CRUSHERS

1—1'8" Traylor TY.
1—410-TZ, capacity 150 t.p.h. through 1¼" square mesh; 10" feed opening.
1—Kennedy No. 25 with motor in pulley.
1—Kennedy No. 49 with motor in pulley.
1—Kennedy No. 19, V-belt drive.

JAW CRUSHERS

66x86 Traylor; 36x24 Farrel; 24x36 Allis-Chalmers; 8x36 Universal Roll Jaw; 18x30 Allis-Chalmers and smaller sizes.

ROTARY DRYERS, DIRECT HEAT

Ruggles-Coles, double shell; 5'x26', 5'x30', 6'x35', 5'6"x60', 80"x45'; Single Shell; 4'x30', 5'x30', 6x40, 6x50, 6x60, 7'x60', 8x60.

ROTARY KILNS

6'x60', 8'x110'.

2—6'x12' ROD MILLS

Hardinge straight side Rod Mills, iron lined, herring-bone steel gears, enclosed gear drive units, charge of rods with each mill. Arranged for peripheral or trunnion discharge. In excellent condition and for immediate shipment.

HAMMER MILLS

32"x15" Penna. SX-2, 4x1" hammers, adj. grate.
36"x24" Gruendler No. 4AA, 60—3"x1" hammers.
24" Mikro Pulverizer No. 4-TH, stirrup hammers.
No. 5 Williams Roller Knife Shredder, 40"x30".
No. 4 and No. 6 Williams "Jumbo".
20" dia. x 24" Dixie, direct conn. 40 H.P. A.C. motor.
24"x20" Jeffrey Type B-2 Shredder.
30"x24" Stedman, Model "A".
No. 3 and No. 5 Jay Bee Mills.

DIESEL GENERATING SETS

1—560 H.P. F-M Model 33, Style M, 257 RPM, 4-cyl., 16"x20", with magnetic clutch and pulley take-off. Used two years.
2—1200 H.P. McIntosh & Seymour, Type 8-B-40, 8-cyl., 20"x24", 250 RPM. For sale with or without direct connected 800 KW Westinghouse d.c. generator. We have just sold two of these sets.

VIBRATING SCREENS

3—4'x7' Leahy, 2 deck, motor driven.
8—3'x5' Tyler Hummer, 2 deck, No. 31, enclosed.
2—4'x7' Jeffrey-Traylor, Type FB-4, 2 deck.
2—3'x7' Simplicity, 2 deck, motor driven.
2—3'x8', 3'x10' Niagara, 3 deck.
1—4'x8' Huron, 1 deck, V-belt drive.

LIME HYDRATOR

Weber Sr. type, made by Arnold & Weigel with No. 1 Raymond Bros. Lime Separator; also Kritzer. One complete Hydrated Lime Plant.

CENTRIFUGAL AIR SEPARATORS

10' Sturtevant; 8', 10', 12', 14' Gayco; 6' Raymond; also 5' dia. Raymond "Whizzer" for attachment to roller mill. 5' Gayco.

BALL, ROD AND TUBE MILLS

Ball Mills: 6'x6', 6'x8'.
Rod Mills: 4'x8', 6'x12' Hardinge, straight side.
Tube Mills: 2—5'x20' Bonnot Co., silex lined.
1—5'x22' Bonnot Co., silex lined.
6'x23', 2—6'6x20' Smidth, silex lined.
5'x22' Allis-Chalmers, 5'x35' Vulcan, both iron lined.

RAYMOND PULVERIZERS

2—4 roll High Side, located Toledo.
Nos. 0000, 00, 1 and 3, Beater type—also Nos. 55, 60, 90 Imp type.

CONSOLIDATED PRODUCTS CO., INC.

15-16-17 PARK ROW — Our Shops at Newark, N. J., cover eight acres. — NEW YORK, N. Y.

LOCOMOTIVES

ALL STANDARD GAUGE EQUIPMENT

SADDLE TANK TYPE

One—4-Wheel	Steam Saddle Tank	27 tons
Three—	" " " "	30 tons
Two—	" " " "	42 tons
One—	" " " "	50 tons
One—6-Wheel	" " "	55 tons
One—	" " " "	60 tons

SWITCHERS

One—6-Wheel	Standard, with tender	65 to 70 tons
One—	" " " "	70 tons
One—	" " " "	71 tons
Five—	" " " "	75 tons
Four—8-Wheel	" " "	100 tons

ROAD

Two—6-Wheel	MOGUL 2-6-0 Oil Burning	56 tons
One—8-Wheel	CONSOLIDATED 2-8-0	80 tons
One— "	" 2-8-0	82 tons
One— "	MIKADO 2-8-2	100 tons
One— "	CONSOLIDATED 2-8-0	100 tons

MISCELLANEOUS TYPES

One—4-Wheel Vulcan-Duplex Steam	57 tons
One—4-Wheel Whitcomb Gasoline	25 tons
One—6-Coupled double ender type 4-6-4 Suburban	80 tons

ALSO: 10 ton, 23 ton, 25 ton LOCOMOTIVE CRANES, WRECKING CRANE, K&J 16 YARD DUMP CARS, 50 ton ALL STEEL HOPPER CARS, 30 ton FLAT CARS

RAILWAY ACCESSORIES COMPANY

Carew Tower — Cincinnati, Ohio

FOR SALE

25-Ton 0-4-0 Davenport Loco., S. G. NEW FLUES. EXCELLENT CONDITION. Immediate Delivery.

1—48-ton 0-6-0 Baldwin Fireless Loco. Built 1922. Good condition.

2—24-Ton Heisler, geared, 36" ga. Locos., A.S.M.E. BOILERS.

SEND US YOUR INQUIRIES FOR ANY KIND OF LOCOMOTIVES.

IRON & STEEL PRODUCTS, Inc.
36 years' experience
13490 S. Brainard Ave., Chicago, Illinois
"ANYTHING containing IRON or STEEL"

FOR SALE

One piece portable crushing and screening plant, size of crusher 9x20.

Twin City Six cylinder 7¼x9 120 H.P. gasoline power unit.

One bag cement mixer with skip hoist.

36" gauge steam locomotive cars, rails, etc.

Irons for American A frame derrick for 12"x12" timbers.

Double cylinder double drum skeleton steam hoist.

Frost center crank steam engine 12"x14" cylinder.

8" sand pump.

Revolving screen inside jacket, 4 ft. diameter, 17 ft. long; outside jacket 6 ft. diameter, 10 ft. long.

Three house moving trucks, complete with steel capstan.

BOX NO. 467
MARSHALLTOWN, IOWA

FOR SALE—Hoist

Name Plate on Hoist

Diamond Machine Company, Monongahela, Penna.
Shop Order No. A-1414.
Drum 51" Wide, 5' Diameter.
Speed 400 ft. per minute.

Name Plate on Motor

Westinghouse Elec. Ind. Motor.
Type C.W., 200 h.p.
400 Volts, 3 Phase.
60 Cycles, 247 Amps. per Term.
580 r.p.m. Full Load.
Style #233880.
Serial #2271208.

Can be seen at Mount Savage, Maryland. For information, write:

UNION MINING COMPANY
507 Oliver Building — Pittsburgh, Penna.

AIR COMPRESSORS

1—2000 CFM Sullivan class WM-31 with 250 H.P. dir. con. synchronous motor 50# pr.
1—1302 CFM I-R class PRE-2, dir. con. synchronous motor, 125# pr.
1—693 CFM C-P class VC, vert., arranged for motor drive, 100# pr.
3—485 CFM I-R class ER1, single stage, horiz., belt dr., 50# pr.
3—603 CFM I-P class POC-2, 125# pr., diesel engine 17" bore x 19" stroke.
16—Portable Air Compressor, 110 to 310 CFM, gasoline and electric driven.

BROOKLYN CONTRACTORS MACHINERY EXCHANGE,
1415 Bergen St., Brooklyn, N. Y. President 3-7778

DEPENDABLE USED MACHINES

Blaw-Knox 120 ton bin.
Johnson Weigh Batchers.
Lorain 40 shovel; 1938; exc. cond.
P&H 206 shovel; like new.
B-G 18x25 port. conveyor; elec.
Sullivan 110 ft. comp.; reblt.; pn. tires.
Crushers, screens, etc.—all sizes.

TRACTOR & EQUIPMENT CO.
3515 West 51 St. — Chicago

FOR SALE

20 Dempster Dumpsters, 2 Yard Models, mounted on White Trucks, 805 Model, Cab over Engine. 5 buckets to each complete unit. All in A-1 condition.

GEROSA HAULAGE & WAREHOUSE CORP.
769-785 East 138th St., New York, N. Y.

CONCRETE EQUIPMENT

Blaw-Knox complete central mixing plant.
Blaw-Knox complete ready mix concrete plant.
Butler 100 yd. 3 compt. bin, weigh batcher.
Beaumont 42 yd. two compt. bin.
200 ton rock storage bin, steel, heavy construction.
Fuller Kinyon bulk cement unloader, portable.
Fuller C40 rotary air compressor, electric.
Smith 1 yd. tilting mixer, electric.
10 Blaw-Knox 3 yd. Ready-Mix bodies.
Ransome 28 S 1 yd. Stationary mixer, elec.
1 Haiss bucket loader, caterpillar.
Barber Greene Model 42 loader, cats.
Barber-Greene Model 62 loader, cats.

BUCKETS—STONE SKIPS

22—Steel stone skips, 2 to 3 yds.
1½ yd. heavy duty Blaw-Knox digging bucket.
1½ yd. Hayward rehandling clamshell.
1¼ yd. heavy duty Blaw-Knox digging, clamshell.
1 yd. Hayward clamshell, rehandling.
¾ yd. Haiss rehandling, clamshell.
1 yd. Hayward orange peel, 4 leaf.
¾ yd. Hayward orange peel, 3 leaf.

SHOVELS—CRANES

2—Marion Diesel shovels, 1¾ yd. cap.
No. 50-B Bucyrus-Erie electric shovel, 2 yds.
Northwest 1½ yd. gas crane, 60′ boom.
Northwest 1 yd. comb. shovel-crane, gas.
P&H Model 600 1 yd. gas crane.
Northwest Model 105 ¾ yd. gas crane.
Browning 13½ ton comb. truck crane shovel, ¾ yd.
Universal 7½ ton truck crane, pneumatics.

TRACTORS

RD-4 Caterpillar, with bulldozer.
D-5 Caterpillar, with bulldozer.

LOCOMOTIVES—CARS

2—Vulcan 6 ton, gas, 36″ gauge.
2—Whitcomb 4½ ton, gas, standard gauge.
8—3 yd. V type 36″ ga. side dump cars.

CRUSHERS—PLANT

Gyratory crushers: K.V.S. 30, 37-S, 49; Telsmith 32, 8A, 8B; Traylor 8″; McCully 12″, 8″, 6″.
Jaw: 6x12, 9x16, 10x20, 12x26, 13x30, 15x30, 16x32, 36x48, 48x60.
Symons 4′ cone Crusher, complete.
Complete portable rock crushing plant, nearly new, with crusher, elevator, screen, etc.

RICHARD P. WALSH CO.
30 Church St. New York, N. Y.

SURPLUS EQUIPMENT

BOILERS, Kewanee Steam Heating
1—2300 sq. ft. Type 750C.

ELECTRICAL EQUIPMENT
3—300 KW, 600 V GE Rotary Converter.
1—300 KW, 600 V GE Switchgear (new).
3—300/450 KVA GE Transformers 22,000/445 V.

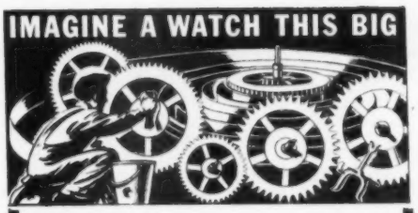
HOISTS
1—60 HP. Sauerman, PTE DD.
1—37 HP. Natl. 48 x 42 SD.
3—35 HP. Natl. DD Tuggers.

PUMPS
1—1,000 GPM 325′ Hd. Cent.
4—4″ Dorrco Diaphragm.
3—Steam Pumps.

WAGONS, Crawler
10-Yd. Patt. Side Dump.
16-yd. Athey 2-Way Side Dump.

BUCKET ELEVATORS:	Steel 320 Ton Cap.
CONVEYORS:	Goodman A&B Shaker
CRANES:	1—20-Ton Loco. Type.
CRUSHER:	2′ Coarse Cone Std. Hd.
GOLD MACHINE:	Ainley 4-Bowl.
JIGS, ORE:	2-Cell Bendelari & Wood.
ROD MILL:	Marcy 4 x 10 RH.
SCREENS, Revolving:	5′x8′ Trommel.
THICKENERS:	2—10′ Elmco.
TRACK SCALE:	28′ Rail 100-Ton Cap.
TRACKSHIFTER:	Std. Ga. Model N.
TRUCKS:	2—10 yd. Diesel Rear Dump Euclids.
WATER TANK:	10,000 Gal. Steel.

BUTLER BROTHERS
PRODUCERS OF IRON ORE
137 East 8th St. St. Paul, Minn.



One of the best ways to visualize the thoroughness of our REBUILDING is to imagine a huge watch, because we take a machine apart piece by piece and clean and inspect each part just like a watchmaker does. All parts showing signs of wear are properly replaced.

AIR COMPRESSORS:

30—Portable gasoline driven air compressors all makes—sizes 310′, 260′, 220′, 160′, 110′.

BINS:

9—1—150-ton Blaw-Knox, 1—118-ton Blaw-Knox, 1—117-ton Blaw-Knox, 1—72-ton Blaw-Knox, 1—75-ton Butler, 1—51-ton Blaw-Knox, 1—35-ton Blaw-Knox, 2—30-ton Johnson offset bins all with or without weigh-batchers, and are 2 comp. bins.

CRANES, DRAGLINES AND SHOVELS:

1—Link-Belt K-55, Serial No. 1698, 70′ boom, 2 yd. bucket, also have 2 yd. shovel attachment.
1—Link-Belt K-48, Serial No. 1728 with 60′ boom, 2 yd.
1—Northwest Model 5, Serial No. 3572 with 50′ boom, 1½ yd.; also pull shovel 1¼ yd. and
3—Northwest Model 4, Serial Nos. 3441, 3445, 3493 with 40′ boom 1 yd.; also 1-yd. pull shovel.
1—Northwest Model 104, Serial No. 2079, 45′ boom, 1¼ yd. bucket; with 1 yd. shovel attachment.
1—Link-Belt, Model K-42, Serial No. 1265, 45′ boom, 1¼ yd. bucket, also 1 yd. trench hoe attachment or 1¼ yd. shovel front.
2—Northwest Model 105, Serial Nos. 2556, 1645, 40′ boom. 1 yd. bucket with one shovel attachment.
3—Osgood Heavy Duty, Serial Nos. 2069, 2087 and 2403, 40′ boom, 1 yd. bucket and 1 yd. shovel attachment.
1—Erie Gas-Air, Serial No. 4365 with 45′ boom and 1¼ yd. shovel attachment.
1—Thew, ¾ yd. Gasoline shovel with ¾ yd. shovel front and 40′ crane boom. Serial No. 2801.
1—Koehring Model 301, Serial No. 544, 40′ boom, ¾ yd. bucket.
1—Northwest No. 2 crane, new 1937 with 40′ boom.
1—P&H Model 206, Serial No. 1901, ¾ yd. 40′ boom.
1—Byers Bearcat Model No. 128, Serial No. 4119, ½ yd. cap. 30 ft. boom.
1—Byers Bearcat Model 27, Serial No. 5289, 30′ boom, ½ cl. sw. ½ yd. bucket.
1—Erie Steam Crane and Shovel with 40′ crane boom, with or without ¾ yd. shovel front.

PNEUMATIC TOOLS:

36—Rock Drills, mounting, wagon, column or tripod.
53—Jackhammers, various makes and sizes.

PUMPS (DREDGE):

2—10″ Morris Dredge pumps to direct connect to motor.
4—Belt driven: 3-Morris Mang., 1—8″, 2—6″; 1—8″ Cataract.

DERRICKS:

Excellent surplus equipment

Double and single laced mast complete with power, guys and turnbuckles

Mast 80 ft.: boom 70 ft. and mast 70 ft.: boom 60 ft.

A. JAY HOFMANN
NARBERTH, PA.
(In authority)

FOR SALE

DUMP CARS: Two Clark 30 cu. yd. capacity Air Dump Cars, good condition.

Smith 56-S Tilting Type Concrete Mixer, 2 cubic yard capacity, excellent condition.

E. E. FORT
1119 S. 56th St. Philadelphia, Pa.

Jaw Crushers—4″x8″ up to 66″x84″.
Crushing Rolls—16″x10″ up to 54″x24″
Gyratory Crushers—No. 3 up to Mammoth
Ring Roll Mills—No. 0, No. 1, No. 1½ and No. 2.
Swing Hammer Mills.
Rotary Fine Crushers—No. 0, No. 1, No. 1½ and No. 2.
Direct Heat Rotary Dryers—3½′x25′, 4′x30′, 5′x30′, 5½′x40′, 6′x50′, 7′x50′ and 8′x50′.
Semi-indirect heat Dryers—5′x30′ and 8½′x75′.
Cement Kilns—3′ up to 8′ diameter.
Hardinge, Marcy & Fuller-Lehigh Mills.
Raymond Mills—No. 00, No. 0, No. 1, No. 2 Roll.
2—6′x12′ and 1—4′x10′ rod mills.
Tube—Rod and Ball Mills—3′ to 6′ diameter.
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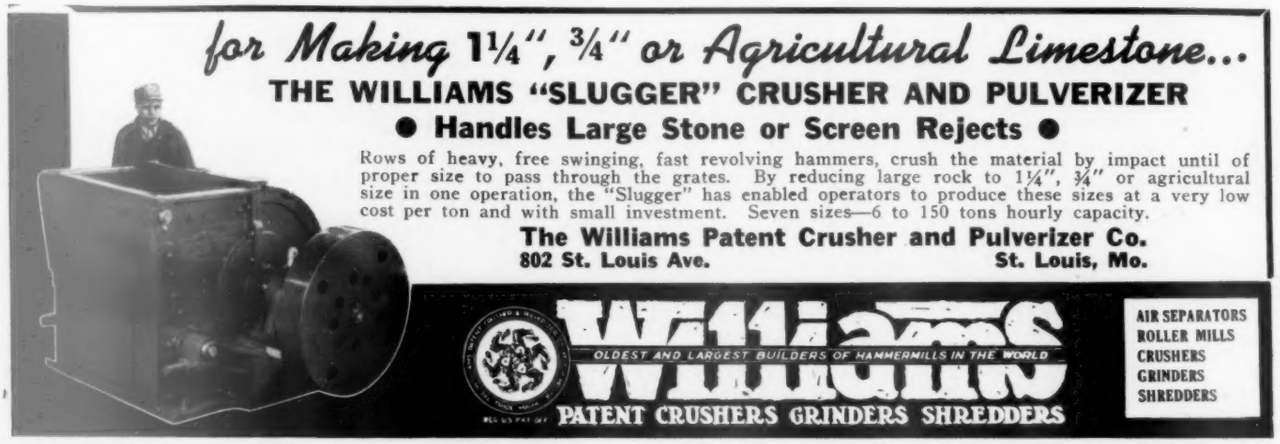
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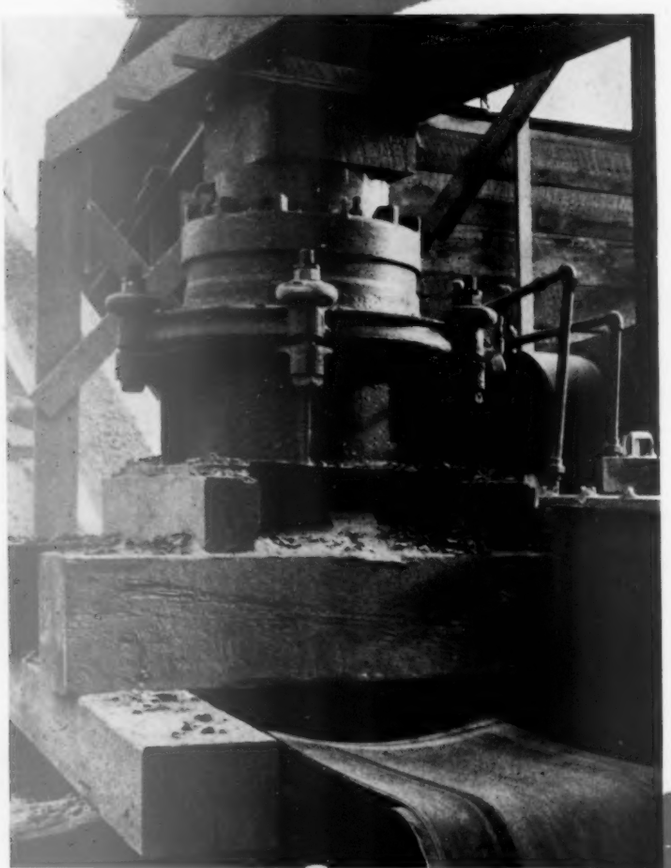

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IC-5

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